1971

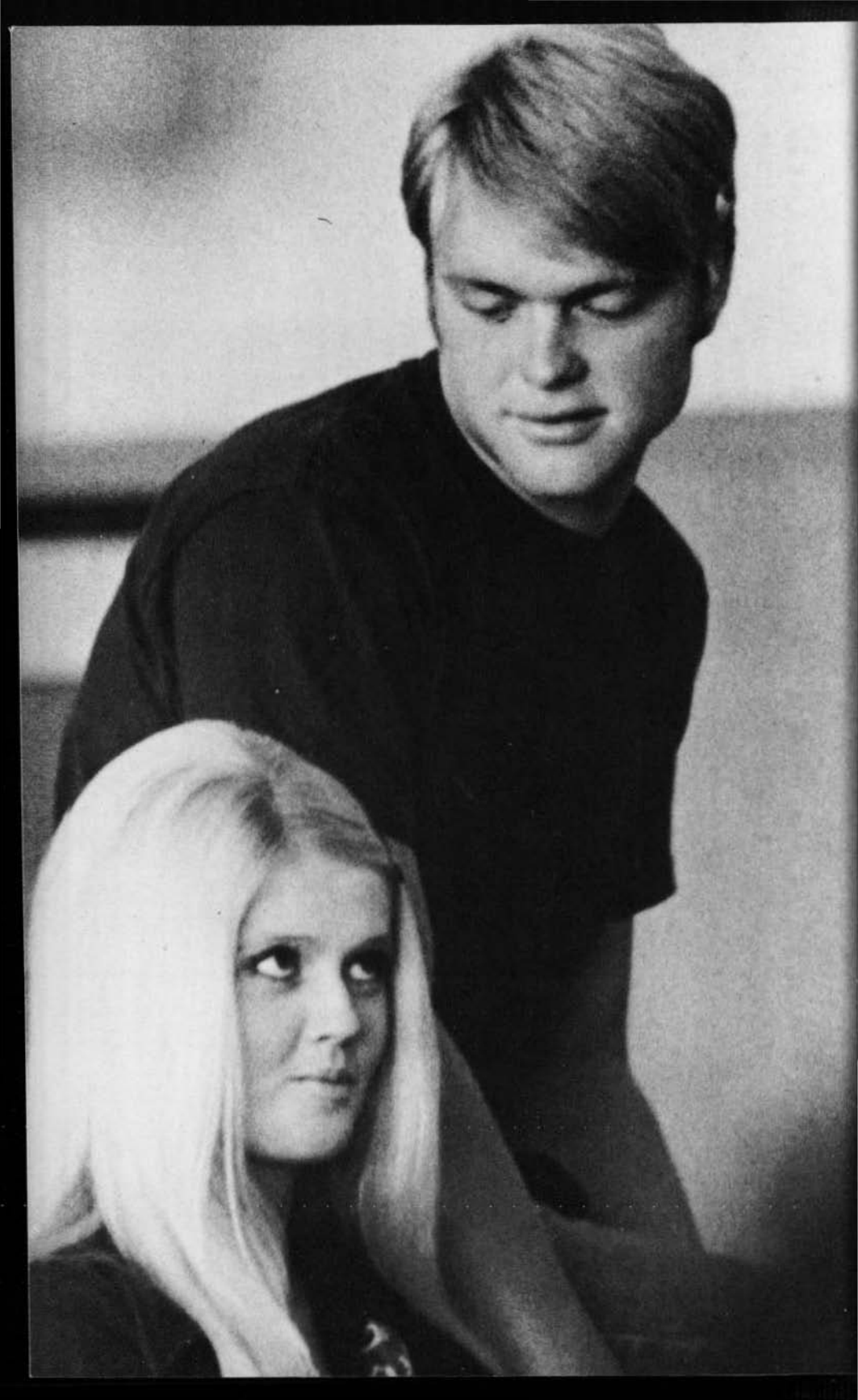
General Catalog 1971-1973

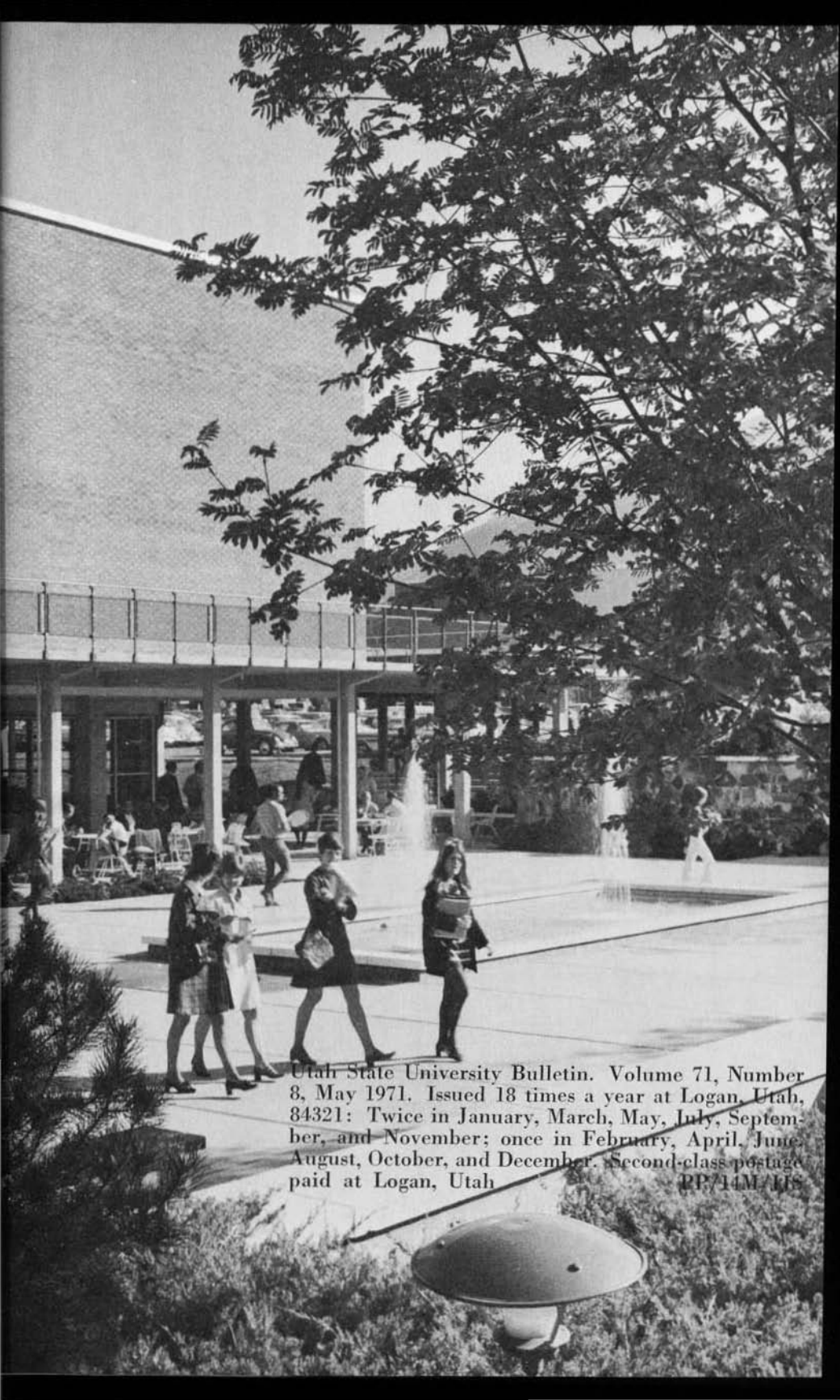
Utah State University

UTAH STATE UNIVERSITY BULLETIN

1971-73 CATALOG

LOGAN, UTAH





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UTAH STATE UNIVERSITY

LOGAN, UTAH
1971-73
CATALOG

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Campus Map, Inside Back Cover

Utah State University

Utah State University offers a wide range of good living and learning experiences, where progress, growth, dicovery, and enthusiasm all move in the same direction — toward the education of the student, his discovery of himself and his potential.

The University has a three-fold purpose: teaching, research, and extension. USU also cooperates with various agencies on a national and international level to help promote understanding and share knowledge.

With a studentbody of 9,000, Utah State has advantages of both the large and small schools, with such features as a spacious new library, excellent laboratories, and top-rated cultural attractions, including world-famous symphonies, ballets, pianists, singers, and lecturers. These advantages are combined with the close, personal attention given to students found at smaller schools.

This University was founded in 1888 as a part of the public educational system of Utah and operates under the constitution and laws of the state. It belongs to a great family of institutions known as land-grant universities, which had their origin in 1862. A rich curriculum is offered in the arts and sciences, in both undergraduate and graduate programs. Degrees granted include the Bachelor of Arts (BA), Bachelor of Science (BS), Master of Arts (MA), Master of Science (MS), several other Bachelor's and Master's degrees, Specialist in Educational Administration, Doctor of Education (EdD), and Doctor of Philosophy (PhD).

USU includes eight resident colleges with 53 departments, a School of Graduate Studies, Extension Services, and several research programs. There are also current programs in educational aid to several foreign countries.

USU is accredited by the Northwest Association of Secondary and Higher Schools, and is on the accepted list of the Association of American Universities, and of the American Association of University Women. It is a member of the American Council on Education and is listed by other accrediting agencies.

A fifteen-member State Board of Higher Education governs the Utah state system of higher education. This board has the responsibility for state-wide master planning for higher education, assignment of roles to the several institutions in the state system, and control of operating and capital budgets for the institutions. USU has a nine-member Institutional Council. This council has the responsibility of implementing the assigned roles, including the appointment of personnel and the enactment of rules and governing regulations.

Logan, Utah, home of Utah State University, is a town of 25,000 located in northern Utah, 80 miles north of Salt Lake City.

The campus has added several new buildings recently, including

a seven-story Business building, a Chemistry building, a Physical Education building, and an Assembly Center.

Utah State University is an Equal Opportunity Employer and it is our policy to provide employees with compensation, promotion and other related conditions of employment without regard to race, color, creed, national origin, sex, or age except where sex and age are beneficial requirements of the respective position. It is our policy to provide equal pay for equal work and avoid discrimination in all phases of employment.

Calendar of Events

Summer Quarter 1971

June 14, Monday	Registration
June 15, Tuesday	Classes begin
July 5, Monday	Independence Day
July 16, Friday	End of first session
July 19, Monday	Second session begins
August 20, Friday	End of Summer Quarter

Fall Quarter 1971

September 23-24, Thurs., Fri.	Registration, Freshmen
September 27, Monday	Registration, former students
September 28, Tuesday	Classes begin
November 25-26, Thurs., Fri.	Thanksgiving recess
December 10, Friday	Classes end
December 13-16, Mon.-Thurs.	Final examinations

Winter Quarter 1972

January 3, Monday	Registration
January 4, Tuesday	Classes begin
March 10, Friday	Classes end
March 13-16, Mon.-Thurs.	Final examinations

Spring Quarter 1972

March 20, Monday	Registration
March 21, Tuesday	Classes begin
May 26, Friday	Classes end
May 29, Monday	Memorial Day holiday
May 30-31, June 1-2, Tues.-Fri.	Final examinations
June 2, Friday	Baccalaureate
June 3, Saturday	Commencement

Calendar of Events

Summer Quarter 1972

June 12, Monday	Registration
June 13, Tuesday	Classes begin
July 4, Tuesday	Independence Day
July 14, Friday	First session ends
July 17, Monday	Second session begins
August 18, Friday	Summer quarter ends

Fall Quarter 1972

September 21-22, Th-F	Freshman, new student reg.
September 25, Monday	Registration
September 26, Tuesday	Class work begins
November 23, Thursday	Thanksgiving Day
December 11, Monday	Class work ends
December 12-13-14-15, T-W-Th-F	Exams

Winter Quarter 1973

January 3, Wednesday	Registration
January 4, Thursday	Classes begin
March 16, Friday	Classes end
March 20-21-22-23, T-W-Th-F	Exams

Spring Quarter 1973

March 27, Tuesday	Registration
March 28, Wednesday	Classes begin
May 28, Monday	Memorial Day
June 1, Friday	Classes end
June 4-5-6-7, M-T-W-Th	Exams
June 8-9, Friday-Saturday	Commencement

Summer Quarter 1973

June 18, Monday	Registration
June 19, Tuesday	Classes begin
July 4, Wednesday	Independence Day
July 20, Friday	First session ends
July 23, Monday	Second session begins
August 24, Friday	Quarter ends

Tuition and Other Fees

The University reserves the right to alter any of these charges without notice.

Fees Per Quarter

[1]**Summer, Fall, Winter, and Spring Quarters**

	Resident Students	Non-Resident Students
Tuition and Registration	$117.50	$287.50
Other Fees	$ 28.50	$ 28.50
Total Fees	$146.00	$316.00

Special Students ..... $10 plus $8 per credit (limit of 6 credits)

Visitor Fee (Audit) ..... $12 per class

[2]General Registration Fee ..... $10 per quarter

[2]Remedial Course Fee (Non-General Registration) ..... $5 per course

Other Fees, Costs

Application and Evaluation Fee (non-refundable): $10 — Graduate Students exempt.

Health and Accident Insurance: Students will be required to participate each quarter in a health and accident insurance program unless a written request for exemption is submitted to the University prior to registration. Approximate cost of the insurance will be $6 per student per quarter.

Excess Registration Fee: Students may register for a maximum of 19 credits per quarter (exclusive of two credits for First Year Basic Military Science or Aerospace Studies or one credit of lower division Physical Education). For each credit above this limit, students must pay $10 for each excess credit.

Automobile Parking Permit: $7.50 per year.

Out-of-State Student Auto Permit: 50¢ (in addition to Parking Permit of $7.50)

Late Registration Fee: $5 beginning second day after specified Registration Days: additional $1 for each additional day up to a maximum of $10.

A student whose tuition check is dishonored by his bank will be charged the late fee in effect when the check is redeemed.

Returned Check (other than tuition check) Charges $2

Change in Course of Study List: No charge for the first week of the Quarter. $1 for each change made thereafter.

Final Deadline for Course Changes: Course changes, adds, or drops may be made through the third week of the Quarter.

Special Examination Fee: Per examination $15

Diploma Fee: Bachelor's ..... $ 5
Advanced Degree $10

Late fee of $2 after January 15 for Bachelor's Diploma.

Student Teaching Fee $36

Teacher Placement Re-registration $5

Locker Rental: Fall, Winter and Spring $1.50. Fifty cents of this fee is refunded to students upon returning the key, accompanied by the receipts, prior to the first Friday following Commencement exercises.

Transcript of Credits: $1 per copy, 25¢ for additional copies on the same order. Transcripts will not be issued unless the money accompanies the order.

Progress Report: 50¢ per copy, 25¢ for additional copies on the same order.

Note fee, on individual loans $2

Cap and Gown Rentals:

Bachelor of Science or Arts $3

Master of Science or Arts $6.50

College of Humanities and Arts: Students using the language laboratory equipment are required to pay a fee of $2 per quarter.

College of Business and Social Sciences: Students using business machines will be required to pay a fee of $2 per quarter.

College of Natural Resources:
Senior Field problems:

Range 496 ..... $30

A maximum fee of $5 per quarter may be charged in any course requiring use of the computer.

A minimum excess breakage fee of $5 may be required for laboratory classes.

Military Activity Fee $5

Music: Individual Instruction with members of the College staff:

Nine lessons per quarter (1 credit) $30

Music 101 Laboratory Fee $1
Fees must be paid at beginning of quarter before instruction begins. Individual instruction with additional authorized teachers is registered for at the college and given like credit, but paid for by private arrangement with the teacher concerned.

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[1]Non-Resident (Non-Utah) students pay the **Resident** Schedule Summer Quarter.

[2]These fees are in addition to regular Tuition and Registration fees.

Practice Fees:

Practice Room with piano, 1 hour per day per quarter $3.50

Organ, 1 hour per day per quarter $5

Speech: The fee for Speech 392 is $20 per credit per quarter, consisting of 10 private lessons.

Registration is not complete until students have presented the fee card at the Cashier's Window, office of the Controller (Main 120), and have paid fees, and filed the registration cards with the Admissions and Records Office.

Refund of Registration Fees: Withdrawal from the University: When a student withdraws from the University not later than the end of the fifth week of the quarter, he is entitled to a refund of registration fees according to the following conditions:

1. Ten dollars of every registration fee is non-refundable.
2. After $10 is deducted from the registration fee paid, refunds are calculated as follows:

Week of qtr. when withdrawal is effective	Percent of remainder to be effective
First	100%
Second	80
Third	60
Fourth	40
Fifth	20
Sixth and later	0

3. No refund will be made unless the student's official receipt and activity card for current registration fees is surrendered to the Cashier's Office at the time of withdrawal.
4. Special provisions apply to students who are required to withdraw during the quarter for active duty in the military forces.

Activity Card: According to the constitution of the Associated Students, a regularly enrolled student must obtain, at time of registration, a studentbody card which will admit him to all activities controlled by Associated Students: athletic events—football, basketball, tennis and track—dramatics and musical entertainments, socials, lectures, etc. A regularly enrolled student is also entitled to a copy of the yearbook if the studentbody fee was paid for all quarters, and a subscription to the University newspaper.

Information on Scholarships, Fellowships, and Assistantships can be found in the section on Student Services and Activities in this catalog.

For **Housing Fees** see catalog section on Student Services and Activities.

For a detailed list of **Summer Quarter Fees,** consult Summer Quarter Catalog.

University Publications: General Catalog $1; Class Schedule Bulletin 25¢. Send request and money to **Distribution Office,** USU.

Typical Expense Sheet for Students

(For the School Year 1971-72)

	Resident Student (Minimum)	Non-Resident Student (Minimum)
Tutition and General Fees	$438	$948
[1]Room (efficiency apartments) and estimated food costs	$530	$530
[1]Room and board	$850	$850
Personal Expenses	$200	$200
Books and supplies	$150	$150
Totals	[2]$2,168	[2]$2,678

[1]Only one of the two housing alternatives is used for the computation of the total expenses. This schedule uses the $850 figure.

[2]Transportation costs should be added to these figures.

Explanation of

Catalog Numbering System

USU operates on a quarterly system — four quarters or periods of classwork: Fall, Winter, Spring, and Summer. Each quarter is of ten to twelve weeks duration. Summer Quarter is divided into two sessions, first and second. The other three quarters are not so divided.

Most classes give either one, two, three, four or five credits for successful completion of the course. As a general rule a class is attended the same number of times per week as the credits offered. For example, a three-credit class generally meets three times a week; a five-credit class, five times a week.

Each course listed in the catalog has a number, given immediately before the name of the course. For example in the English Department there appears:

109. Elements of Grammar.

This means the course, Elements of Grammar, is English 109. The numbers are useful for reference and records.

Course Numbering Code. A standard code employed by all institutions in the State System of Higher Education was adopted by USU in 1970, changing all previously used numbers. The present numbering system is as follows:

050-099 Terminal Courses; would not ordinarily satisfy baccalaureate requirements; non-transferable

100-279 Lower division (Freshman and Sophomore courses)

280-299 Lower division independent study designation (Directed reading, individual projects, etc.)

300-379 Upper division (Junior and Senior courses)

480-499 Upper division independent study designations (Directed reading, individual projects, festivals, institutes, workshops, etc.)

500-599 Advanced upper division (graduate credit allowed for departmental majors or by permission of student's department chairman)

600-799 Graduate courses (students without baccalaureate degrees must obtain special permission to enroll.)

590-599
690-699
790-799 Independent study designations (directed reading, individual projects, thesis, dissertations, etc.)

Master's Thesis

(697) Thesis research

(698) Research consultation

(699) Continuing registration

Doctor's Dissertation

(797) Dissertation research

(798) Research consultation

(799) Continuing registration

680-689
780-789 Graduate seminars (includes methodology and research seminars)

"H" following regular course designation indicates Honors Program courses.

Numbers in parentheses following present numbers indicate previously used numbers.

A Freshman or Sophomore may take any lower division course. If there is a prerequisite for a particular course, it will be so stated in the course description. He may take an upper division course if he obtains in advance the consent of the instructor and his adviser.

A Junior or Senior may take any lower or upper division course. Any prerequisites to a course will be mentioned in the course description. He may take certain graduate courses if he obtains in advance the consent of the instructor and his adviser.

A Graduate student may take any course, but only graduate courses and individually approved undergraduate courses yield graduate credit.

At the end of each course description are listed the number of credits given for the course, the quarter/s it will likely be taught, and the name of the instructor. The credits and the quarter/s it will be taught are indicated in abbreviated form in parentheses. For example: (3F) indicates that the course offers three credits and will likely be taught Fall Quarter. (5F, W, Sp, Su) indicates that the course offers five credits and will likely be taught all four quarters: Fall, Winter, Spring, and Summer. It *does not* mean that a student has to take the class all four quarters, but rather that he has his choice of any quarter. In some cases, such as (5F, W, Sp) even though more than one quarter is indicated, the course will not be given each quarter, but only one of these quarters, the exact one yet to be decided.

For more definite, up-to-date information one should refer to the Class Schedules published prior to the beginning of each quarter: Summer, Fall, Winter, and Spring. All catalog listings are subject to change.

Occasionally two or more closely related courses will be listed under one entry, such as Chemistry **306, 307, 308. Physical Chemistry.** The credit entry will read: (3F, 3W, 3Sp). That means that each of the three courses, 306, 307, and 308, offers three credits.

Where a single course, for example Music **336. University Chorale.** has such an entry: (2F, 2W, 2Sp) it indicates that the same course may be taken for credit more than just one quarter. Chorale, for example, could be taken all three quarters, giving two credits each quarter. Such courses, however are the exception. The great majority of courses can be taken only once for credit.

In some classes the amount of credit for which students register can be individually arranged. One student may take two credits, another student three credits, etc. On such courses the notation appears (Credit arranged.), meaning the credit is individually arranged between student and instructor, the amount of credit depending upon the amount of time and effort one wishes to devote to it. Five is the maximum number of credits that can be earned except for a thesis course or unless otherwise specified.

Preceding the number of some courses will be either a single asterisk (*) or a double asterisk (**). Such courses are taught only on alternate years. Those with a single asterisk are taught during the current catalog year; those with a double asterisk are taught

the following year. Again, it should be remembered that this may only be tentative; it is well to check the Class schedule or to consult the course instructor or department head for verification.

List of Terms Used in Catalog

Departmental abbreviations:

Acct — Accounting

Ag Econ — Agricultural Economics

Ag Ed — Agricultural Education

AgIE — Agricultural and Irrigation Engineering

An Sci — Animal Science

Ap St-CS — Applied Statistics-Computer Science

Art

AS — Aerospace Studies

BA — Business Administration

Bact, PubH — Bacteriology, Public Health

BE, OA — Business Education and Office Administration

Bot — Botany

CD — Communicative Disorders

Chem — Chemistry

Civil Engrg — Civil Engineering

CT — Clothing and Textiles

Dairy — Dairy Science

Econ — Economics

Ed Adm—Educational Administration

Elec Engrg — Electrical Engineering

Elem Ed — Elementary Education

Engl, Journ—English and Journalism

Entom — Entomology

FCD—Family and Child Development

FN — Food and Nutrition

For Sci — Forest Science

FSI — Food Science and Industries

Geol — Geology

HEcEd — Home Economics Education

HEM — Household Economics and Management

History

HPER — Health, Physical Education and Recreation

IM — Instructional Media

ITE — Industrial and Technical Education

LAEP — Landscape Architecture and Environmental Planning

Lang, Phil — Languages and Philosophy

Math — Mathematics

Mech Engrg—Mechanical Engineering

Mfg Engrg — Manufacturing Engineering

MS — Military Science

Music

Physics

Physiol — Physiology

Plant Sci — Plant Science

Poli Sci — Political Science

Psych — Psychology

Range — Range Science

Sec Ed — Secondary Education

Soc, SW, Anthr — Sociology, Social Work and Anthropology

Soils, Met — Soils and Meteorology

Sp Ed — Special Education

Speech

Th Arts — Theatre Arts

Vet — Veterinary Science

Wildlife — Wildlife Resources

Zool — Zoology

Also: g.p.a. — grade point average

UNIVERSITY LIBRARY AND LEARNING RESOURCES PROGRAM

University Library and Learning Resources Program

University Librarian and Director Milton C. Abrams
Office in Library 229

Objective. The Library and all other educational media programs and services at the University are combined in a single administrative organization: The University Library and Learning Resources Program. This organization provides for an extension in the use of all educational media whether the use is directed by classroom activity or individual inquiry. The term media is interpreted to mean books, journals, public documents, maps, and micro reproductions of these, as well as films, graphics, and audio-video recordings. The material housed in the new organization has been made accessible through centralization of inventory, cataloging and distribution policies conducted according to standard library procedures and practices.

The housing and arrangement of materials are intended to promote the use of new media forms made available by new educational theories and technology and to give new prominence to the educative quality of books.

ORGANIZATION

University Librarian and Director of the Learning Resources Program: Milton C. Abrams

Associate Librarian for Materials Selection: John Mark Sorensen

Associate Librarian for Special Research and Reference:
Ida-Marie Jensen

DIVISIONS

Teacher Improvement

Associate Director:
Douglas D. Alder

Objective: To stimulate, plan and facilitate the improvement of teaching on campus. To provide extended use of the services and materials available in the program in order that they might be more meaningfully involved in the educational process and that they thereby recognize the need for the systematic harnessing of the technology of teaching.

Materials Acquisition

Associate Director:
Dick L. Chappell

Objective: To coordinate the acquisitions and processing functions of the Learning Resources Program. This includes fund accounting and records management for the program.

Departments/Services

Cataloging: Reed Painter
Records Management and Processing: Richard Jensen

Media Production

Associate Director:
Arthur L. Higbee

Objective: To coordinate all production services on campus into a unified, cohesive unit responsible for the creation of learning materials used in the learning-teaching process, as well as other University-related materials.

Departments/Services

Editorial: John J Stewart

Graphics: Duane E. Hedin

Photography: Arlen L. Hansen

Printing: Clark J. Kidd

Radio-Television:
Burrell F. Hansen

Distribution

Associate Director: Max Peterson

Objective: To provide efficient methods and procedures for learning materials distribution and control. Learning materials include all types of media, i.e. films, filmstrips, books, periodicals, tapes, videotapes, records, microfilms, maps, etc., and the equipment necessary to utilize these materials.

Departments/Services

Collection Management:
Russell Dean

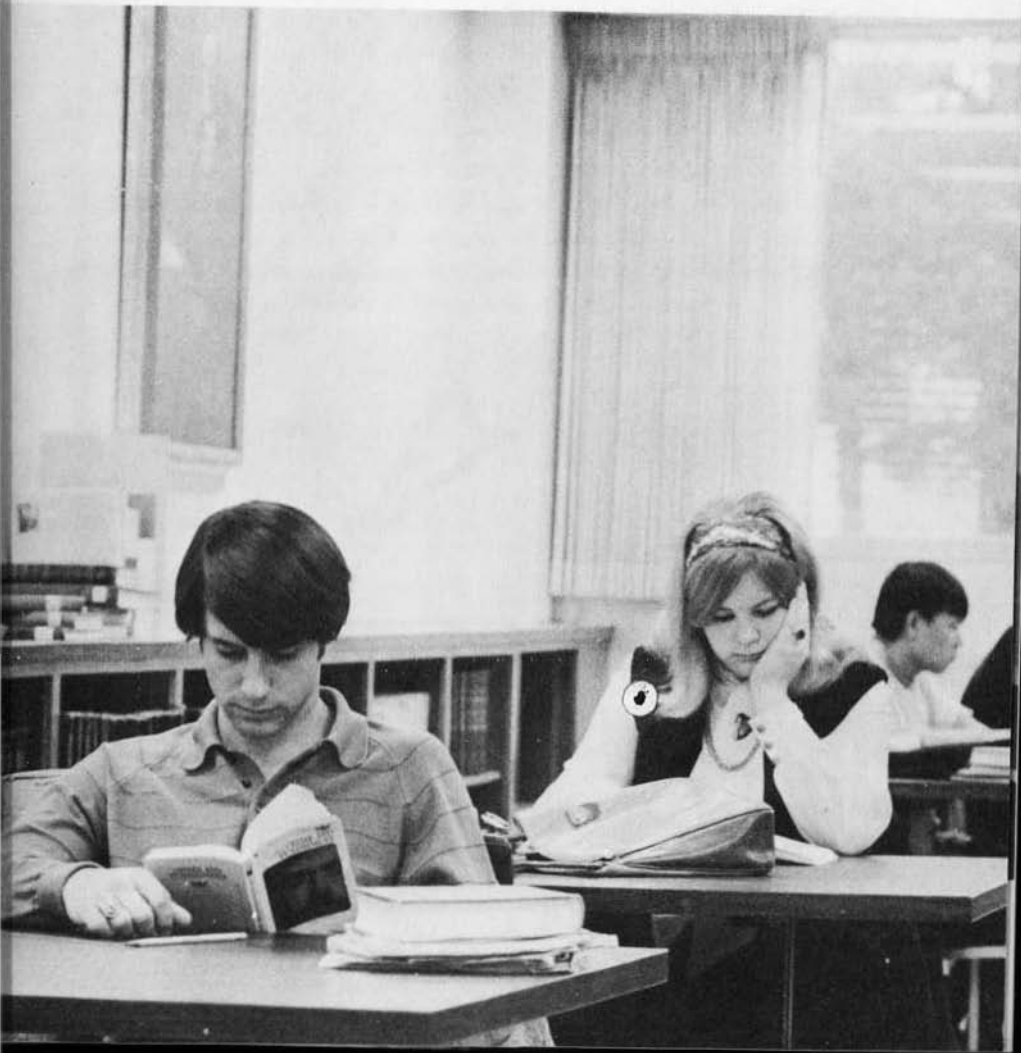
Curriculum Materials:
Marjorie Hatch

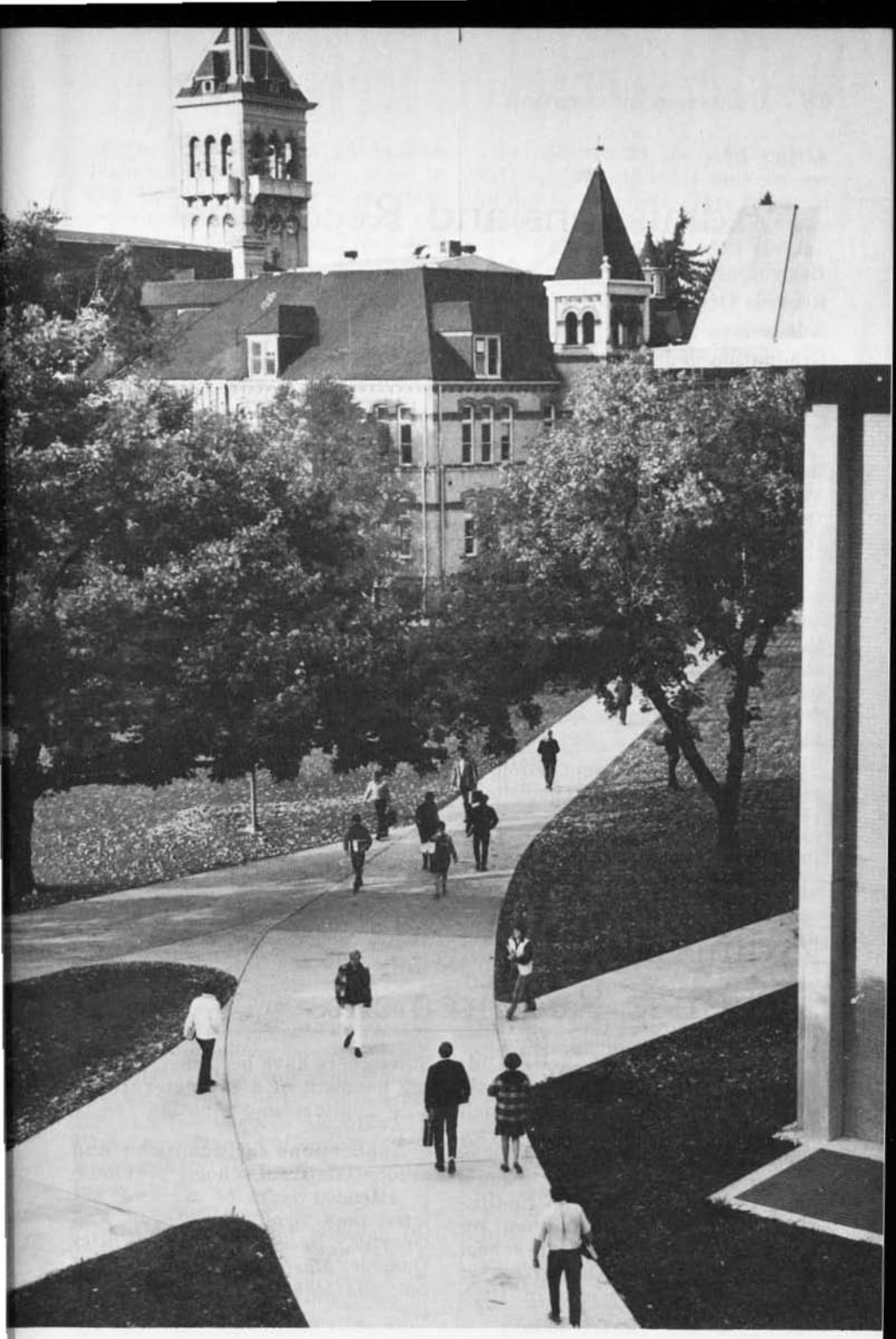
Moore Library: Ruth Rice

Non-Book: LaDell Hoth

Reference: Karlo Mustonen

Special Collections and Archives:
Jeff Simmonds





ADMISSIONS AND RECORDS

Office of

Admissions and Records

Dean L. Mark Neuberger
Records Officer Asa L. Beecher
Admissions Officer Evan J. Sorenson
Graduation and Veterans' Affairs Officer Norman O. Wahlstrom

Office in Main 104

The Office of Admissions and Records is the official guardian of all permanent academic records of the University. It performs the following academic services:

1) **Admission of Students:** interviewing prospective students; evaluation of Freshman credentials; evaluations of advanced standing credentials; processing permanent records; student deferments; reports to government agencies.

2) **Registration:** preparation of registration material (packets); registration procedures.

3) **Records:** processing registration material; course changes; recording grades; progress reports; transcripts; microfilming.

4) **University Records.**

5) **Scheduling:** schedule bulletin; assignment of rooms; record of approved courses.

6) **Graduation:** checking and summarizing graduation requirements.

7) **Veterans' Affairs.**

8) **Statistics:** periodical reports; special reports.

Admission: Entrance Requirements

Admission to Utah State University is granted upon the basis of an official application which includes transcripts of credit from schools previously attended. The Uniform Application for Admission to Utah Collegiate Institutions may be obtained upon request from any Utah high school principal, or from the Office of Admissions and Records of Utah State University.

Students will not be permitted to register until all admission requirements have been met, including payment of a $10 non-refundable application-evaluation fee.

Applications for admission and credentials from schools previously attended *must be received not later than September 1 for Fall Quarter; December 1 for Winter Quarter; March 1 for Spring Quarter; and May 1 for Summer Quarter.*

The standard minimum requirement for admission to any college

of the University is graduation from an approved high school in the United States or equivalent training in any country whose education systems differ from that in the United States.

Health Form. All Freshmen and transfer students under thirty-one years of age are required to complete the Medical Examination Record and return it directly to the Office of Admissions and Records before a permit to register will be issued.

Testing. All Freshmen, including transfer students with less than 45 credits and all other transfer students who have not completed one full year of Freshman English, must present the results of the American College Testing Program Examination (ACT) as part of their application for admission to the University.

American College Test. ACT scores may be used as one of the criteria for admission, and they are always used to assist deans, heads of departments, and advisers in placing students in appropriate class sections, advising them concerning course loads, and in helping them with other similar academic decisions. *Therefore, test results must be part of the students' application records before they will be issued permits to register.* The test scores must be sent directly to the University through the Records Department, The American College Testing Program, P.O. Box 451, Iowa City, Iowa 52240.

Testing dates and general information about the ACT examination may be obtained from high school counselors or by writing to the American College Testing Program, P. O. Box 451, Iowa City, Iowa 52240.

In addition to the ACT examination, new students may be required to complete other types of testing after they arrive on campus. Notification of such specialized tests will be given at Freshman orientation.

Graduates of Utah high schools will be admitted to the University if they are entering USU directly from high school. Students with a predicted grade point average of less than 1.8 (earned g.p.a. of approximately 2.25) will be admitted to General Registration.

Graduates of non-Utah high schools will be accepted in full standing if they present a predicted grade point average of 1.8 or above (earned g.p.a. of approximately 2.25) and are entering USU directly from high school. Students who present a predicted grade point average below 1.8 will be referred to the Admissions Committee and will be accepted or rejected on the basis of approved test scores and other information. Required test scores must be provided by the student.

Admission to the University does not imply permission to register for any course for which there is insufficient preparation. Deans and department heads may require prerequisites for certain courses. Students at USU are expected to demonstrate in all classes that they have adequate general preparation for college study, apart from particular prerequisites for particular courses. Especially will the student be held responsible for: 1) the ability to read and adequately interpret assigned material, 2) the ability to take accurate notes on lectures, 3) the ability to write examinations and papers expressing in acceptable syntax and organizational form, with proper attention to punctuation, spelling, and other

mechanics, the student's own thoughts and those gained from lectures and readings, and 4) the ability to perform the ordinary arithmetical calculations taught in all elementary and secondary schools. The instructor of a class in any subject may fail or penalize in lesser ways a student for inadequate performance in these basic skills.

A candidate for any degree or diploma from any of the colleges of the University must include among the units presented those preparatory courses specified as prerequisites to beginning University courses in the various fields. Students are urged to give serious thought to the selection of a major field of interest. In this regard, they, in cooperation with parents, high school principal or other school adviser, should plan their school program so as to meet the specific requirements for admission. Failure to do this may delay starting work at USU until the prerequisite courses are made up. Not all of the colleges and departments of the University have specified prerequisites, but those which do have prerequisites list them in their college and departmental sections in this catalog.

Even though a student is not a high school graduate, if he is over the age of 18, he may be admitted by presenting satisfactory evidence of ability to do university work. This evidence may be demonstrated by scores on the American College Testing Program (ACT).

Division of General Registration. General Registration is the division into which students may be admitted who do not qualify for enrollment into one of the academic colleges. These include Utah residents who have graduated from high school with less than a 2.2 grade point average, non-Utah residents and transfer students from other institutions of higher learning with less than a 2.2 g.p.a., and former USU students seeking readmission with less than a 2.0 grade point average. Except for Utah residents seeking admission for the first time, admission into General Registration is by permission of the Admissions Committee. First quarter Freshman students admitted into the division of General Registration may be required to enroll and attend the orientation and study skills instruction. Noncredit remedial courses of English and mathematics will be required of students whose American College Test scores show deficiencies in those subjects. (See "Low Scholarship and Probation," page 26.

A General Registration student may be admitted to a college upon application by the student when he has passed the remedial and other courses with a cumulative grade point of "C" or above.

Acceptance by the Office of Admissions and Records does not automatically guarantee housing accommodations. Application for University housing should be made to the Student Housing Office, 1151 East 7th North, or, in the case of LDS accommodations, to David O. McKay Student Living Center, 10th North and 13th East, Logan.

Advanced Placement. USU participates in a program of advanced placement with students who graduate from high school and present Advanced Placement Examinations under the following conditions:

1) Students may receive 12 credits and advanced placement for a composite score of 5, 4, or 3

on any Advanced Placement Examination taken at the completion of a full-year course, with class meetings held each day of the school year, organized according to the description published by the Committee on Advanced Placement of the College Entrance Examination Board.

2) Students who present a composite score of 2 on both parts of an Advanced Placement Examination taken at the completion of a full-year course, with class meetings held each day of the school year, organized according to the description published by the Committee on Advanced Placement of the College Entrance Examination Board, may be given consideration for advanced placement with credit, advanced placement without credit, or neither of the above.

3) USU will recognize advanced placement with credit only for those areas which have been established by the College Entrance Examination Board. The basis of consideration shall be the Standardized College Entrance Examination Board Advanced Placement Test.

Credit by Special Examination. In special cases, students may be permitted to obtain university credit by passing examinations in subjects not taken in classes. Credit for a subject taken in a course for which a grade other than passing has been received cannot be acquired by means of special examination. This privilege does not permit the combination of "visiting" or "auditing" a class with a request for a special examination as a means of acquiring credit. Neither does it contemplate outside assignments or outlines on the part of the instructor being combined with an examination to acquire credit. This privilege is intended to measure information and training gained from practical experience that may be considered the equivalent of the experience and training received by students in an organized course given in the University.

A maximum of 48 credits may be acquired in areas other than foreign languages, and, in addition, a maximum of 25 credits in a foreign language may be granted by special examination. None of the last 30 credits presented for a Bachelor of Science degree may be obtained in this manner. Unless the examination is taken prior to the close of the second week of any quarter for which a student enrolls, the credits gained will be included as part of the load for the quarter.

Special examinations are given only to students regularly registered in residence at the time the request for examination is made.

Credits earned by special examination cannot be used for satisfying the requirements for a graduate degree nor used to meet the resident requirement for graduation.

Application forms for permission to take special examinations are available in the Office of Admissions and Records.

Credit for Military Service and USAFI Courses. The University may grant credit to a student currently enrolled at the University who has served in the Armed Forces. Application for credit is made by submitting his DD214 form to the Office of Admissions.

College level courses taken through the United States Armed Forces Institute may be accepted for credit.

Transfers from other Colleges. The University does not grant

collegiate credit for high school work in excess of graduation requirements. Transcripts of credit must accompany applications for admission when submitted by students who have attended other collegiate institutions. Transcripts submitted for evaluation become the property of the University, and are not returned. *A student who fails to submit transcripts from all institutions previously attended is liable to suspension from the University.*

Credit will be granted for work completed, with satisfactory grades, in other accredited institutions except for credit earned by special examination. Transferred credit may be accepted for filling specific requirements if satisfactory evidence is presented that the work completed is equivalent to the work to be substituted.

The University accepts transfer credit from accredited junior colleges. A transfer student who presents an associate degree from an accredited Utah junior college will be considered to have fulfilled the institutional group requirements. (Some curricula, as in the professional colleges, do not include these group requirements.) He must still comply with the specific requirements of the college and major department in which he expects to earn his bachelor's degree and must complete not fewer than 60 credits of upper division work.

Students who transfer to USU after having had one or more quarters of college work at another accredited institution will be accepted in good standing if they have a cumulative grade point average of 2.2 or better.

Students who have a cumulative grade point average between 2.0 and 2.2 will be referred to the dean of the college of their choice for admission to that college. If unacceptable to the dean of the college, such students will be considered for admission by the Academic Admissions Committee if they have earned fewer than 135 credits.

Exceptions may be made by the Admissions Committee. ACT test scores, the recommendations of counselors, and the student's experience in non-academic pursuits will be considered. Students who have a grade point average below 2.0 will be admitted only upon the approval of the Admissions Committee and must have the recommendation of an academic dean if over 135 credits have been taken.

All subjects taken, whether in high school or in college, will be considered in determining the eligibility of students applying for admission to USU. The Office of Admissions and Records will establish the grade point in all questionable cases. Grade point average will be computed on the total number of credits taken.

Foreign Student Admission. The following information must be submitted to the Admissions Office three months prior to the beginning of the quarter for which a foreign student wishes to be considered for admission:

1) Utah State University application for admission for students outside the United States, Parts I and II.

2) One copy of official transcripts and certificates or certified true copies for each secondary school, college, and university attended with official translation of all documents not in English.

3) One small photograph attached to the application.

4) Physical examination given by a licensed physician (MD).

5) Financial statement indicating the student has $200 or more per month as long as he is a student at USU.

6) The Test of English as a Foreign Language (TOEFL) scores from countries in which English is not the official language.

Students admitted to the University will be required to take an English examination when they arrive on campus to aid in advisement and English placement.

Readmission. Former students of the University returning after an absence of one or more quarters are required to file applications for readmission not later than September 1 for Fall Quarter, December 1 for Winter Quarter, March 1 for Spring Quarter, and May 1 for Summer Quarter.

Exception. Students who were in attendance the previous Spring Quarter are not required to reapply for Fall Quarter unless they have been suspended, or have gone through commencement.

Registration and Credits

Credits. A "credit" is given for one hour of lecture or three hours of laboratory work each week for 12 weeks. In the past, credits have sometimes been referred to as credit hours or quarter hours.

Class Standing. Forty-five credits of approved college work in addition to the prescribed entrance requirements are required for Sophomore rank; 90 credits for Junior and upper division rank; and 135 credits for Senior rank. These figures include the required credits in Physical Education, Military Science, or Aerospace Studies.

Assignment of Adviser. When students have been admitted to USU and have indicated their proposed major field of study, their name is forwarded to the dean of the college concerned. He will assign an adviser who will assist in registration and vocational planning. Students remain with the same adviser throughout their University program unless in consultation with their dean a new adviser is assigned or unless their major field is changed.

Registration. On each registration day, students are permitted to register according to an alphabetical schedule to be announced later.

In case a student cannot call for his registration materials at the hour scheduled for their release, he may receive them at a later hour. But in fairness to other students, registration materials cannot be released earlier than the time scheduled. Observance of this fact and respect for the right of others will greatly facilitate registration procedures for all concerned.

Registration is not complete until the fees have been paid and registration materials turned in at the Cashier's window.

The program of courses listed on the registration card, approved by the dean and filed in the Of-

fice of Admissions and Records, is the official registration for the quarter. Students are held responsible for the satisfactory completion of the entire program unless an official change-of-registration form is filed with the Office of Admissions and Records. An "F" grade will be recorded in case of failure to obtain a passing grade or an incomplete in any course for which students are registered, regardless of the reason for the failure.

Registration Procedure. See quarterly Schedule Bulletin for steps to follow in registration.

Penalties for Late Registration and Late Registration Fee: $5 beginning the second day after specified registration days; additional $1 for each additional day, up to a maximum of $10.

The amount of work for which students are allowed to register will be reduced by one-and-one-half credits for each week, or fraction thereof, that they are late in registering.

Changes in Registration. Any changes, deletions or additions in original registration must be recorded and appropriately approved on the official change-of-registration form.

Adding Courses. Courses may not be added for credit after the tenth day of instruction without approval of the instructor and the student's academic dean.

Dropping Courses. Drop and Add Cards will be issued by the Office of Admissions and Records beginning on the sixth day of instruction of the quarter. Through the tenth day of instruction a student may be permitted to drop classes without notation on his transcript. Beginning on the eleventh day courses dropped will be entered on the transcript and reflect withdrawal (W). Withdrawals from courses beyond the 45th day of instruction of a quarter must be for unusual circumstances and be approved by the Vice President for Student Affairs. The signature of the teacher concerned and the faculty adviser will indicate that these individuals, in turn, have been advised of the withdrawal.

Withdrawal From the University. After the 45th day of instruction, withdrawal from the University will not be permitted except for unusual circumstances and approval by the Vice President for Student Affairs. (Withdrawal made after the 45th day of instruction cannot be reflected on the student's record prior to the end of the quarter.)

Complete Withdrawal Procedures. 1) Obtain withdrawal forms from the Office of Admissions and Records. 2) Report to the Office of Student Services for termination interview and signature of the Vice President for Students Affairs. 3) Obtain the signatures of each instructor; withdrawal (W) will be entered on the form for each course and will be reflected on the transcript. 4) Advise the academic dean and faculty adviser of the withdrawal decision, and obtain their signatures on the Withdrawal Interview Record.

Change-of-Registration Fee. There is no charge for the first five days (after changes are permitted), $1 for each change card filed thereafter.

Withdrawal from the University. Students withdrawing from USU should: 1) Obtain withdrawal forms from the Office of Admissions and Records. 2) Report to the Office of Student Services for termination interview. 3) Obtain the following signatures on Withdrawal Interview Record

card: a) faculty adviser, b) dean of college. 4) Take Withdrawal Permits and Withdrawal Notice to the Office of Admissions and Records. 5) Take Withdrawal Notice to Controller's Office for refund.

Visitor's (Auditor's) Permit. If students wish to attend regularly any class for which they are not registered, they must obtain a visitor's permit from the Office of Admissions and Records. No credit will be allowed for such attendance, but a fee of $12 **per class** is charged. The official forms, properly executed, must be submitted to the Office of Admissions and Records before attendance at a class is permitted.

Importance of Submitting Forms to the Office of Admissions and Records. The special change-of-registration form, properly executed, must be filed at the Office of Admissions and Records before any change becomes effective. Withdrawal from a class without adhering to the regulations specified above and before the deadline makes it mandatory upon the instructor and the Dean of Admissions to record an "F" grade. Attendance at classes without official registration as defined above, and before deadline as specified above, will result in forfeiture of any credit for such attendance.

Responsibility of Instructors. Instructors are charged with the responsibility of denying students the privilege of attending classes if they have not complied with regulations for admission to classes.

In the event students register for a class which is later cancelled, it is the responsibility of the teachers to notify the Office of Admissions and Records so that the students may be properly withdrawn from the class.

Normal Registration. Fifteen credits, exclusive of two credits in basic Military Science or Aerospace Studies or one credit in Physical Education, is the normal registration for any quarter.

Maximum Registration. The student's adviser and dean of the college in which he is registering must approve his registration regardless of the amount of credit. Whether it should be lower or higher than "normal registration" will depend upon several factors, such as part-time employment, extracurricular activities, the student's capacity or aptitudes, his amount of preparation for specific courses, and his degree of progress or scholastic status. A student is not allowed to register for less credit than that listed for a course in order to bring the total registration within the maximum limit as herein defined. Students may register for a maximum of 19 credits per quarter (exclusive of two credits for First Year Basic Military Science or Aerospace Studies or one credit of lower division Physical Education). For each credit above this limit, students must pay $10 for each excess credit. Registration is construed to include any extension, correspondence, institute, or other work carried for credit, or for removal of high school deficiencies, during the period of the school year.

Minimum Registration for a Full-time Student. The minimum registration for a full-time student load is considered to be 12 credits. To be eligible for studentbody offices students are required to be registered for 12 credits or more. Veterans are required to be registered for 12 credits or more to qualify for full subsistence. Students deferred by the Selective Service System under II S classification should com-

plete 25 percent of the total number of credits required for graduation each academic year (September through August). Students in five-year courses should complete 20 percent of the total each year. *Note:* Students who take more than six credits will be charged full fees for the quarter. (See pages 8 and 9 on Special Fees.)

Incomplete Work. Students are required to complete by the end of the quarter all courses for which they have registered. This includes correspondence courses (Independent Study) for which a student may be concurrently registered. Incomplete grades can be granted by an instructor only when permission is granted by the dean of the college in which the course is offered before the close of the quarter. The necessary petition form may be obtained at the Office of Admissions and Records or the dean's office. All "Incompletes" for undergraduate students must be made up within a period of 15 months. If this is not done, the "Incompletes" will be frozen on the permanent academic records.

Low Scholarship and Probation. *A student shall be placed on warned status* at the end of the quarter in which his cumulative grade point average is 4 points less than would be required for a 2.0 grade point average. He shall remain on warned status until his cumulative grade point average is raised to or exceeds 2.0.

A student shall be placed on probation at the end of the quarter in which his cumulative grade point average is 12 or more points less than would be required for a 2.0 grade point average. A student shall remain on probation until his cumulative grade point average is raised to or exceeds 2.0. Following the quarter for which a student is placed on probation, *he shall be notified of his status by a letter from his academic dean in which he shall be instructed to visit his adviser before the end of the fifth week to sign a statement by which he acknowledges the terms of the probation. The signed statements shall be collected in the academic dean's office.*

A student on probation shall be suspended at the end of the quarter in which his grade point average for the quarter is less than 2.0.

A suspended student may be considered for retention by the Appeals Committee at the recommendation of the student's academic dean.

After a student who has been dropped for low scholarship has been out of the institution for one quarter or more, he may apply for readmission. Such application is made to the Admissions Committee. If permitted to register, he may enroll in the General Registration unit on probationary status.

A student on probation in General Registration who does not maintain a "C" average" may be denied permission by the Admissions Committee to re-register in that unit. In such cases the Chairman of the Admissions Committee will recommend to the President that the student seems unable to profit from the University experience and should be dropped from the University.

If a student is admitted on "warned" status and fails to maintain a satisfactory grade point average for two quarters, he may be suspended at the end of the second quarter. Students who are admitted on probation may have only one quarter in which to remove probational status.

Students in the low scholarship group may not register for more than 15 credits per quarter exclusive of one credit of Physical Education, or two credits of Military Science or Aerospace Studies.

General Education Requirements

The lower division is composed of courses taken in the Freshman and Sophomore years. The main purposes of this division are to provide a broad and integrated background in the principal fields of human knowledge, and to prepare for the major work upon which a student will concentrate in the Junior and Senior years.

Provision is made in several departments for the issuance of Certificates of Completion for two years of work as prescribed by these departments.

To become a candidate for the Bachelor of Science degree a student should plan courses with great care through consultation with faculty adviser, major professor, and dean.

Explanation of General Education Prefixes

The State Board of Higher Education has ruled that general education courses in the Humanities, Social Sciences, Physical Sciences and Life Sciences be identified with the following prefixes:

SS—Social Sciences

LS—Life Sciences

PS—Physical Sciences

HU—Humanities

Courses with these prefixes, completed at member institutions, will now be acceptable toward filling general education requirements at other institutions within the State System. Common numbers for the specific courses will appear in all institutional catalogs. These courses are indicated in section IV below.

To complete the work of the lower division the following general education requirements should be satisfied:

I. Complete 90 credits of work with an average of "C" or higher.

II. Prepare a foundation of at least 15 credits for the field of specialized study in the upper division.

III. Completion of Freshman English (English 101, 102, 103) or equivalent, usually during the Freshman year. Except in extraordinary instances, beginning Freshmen are required to take English 101 in their first quarter of enrollment and to continue in the sequence every subsequent quarter of enrollment until satisfactory completion of the nine credits in Freshman English or its equivalent required for graduation. All exceptions must be cleared first through the student's adviser, then through his academic dean, and finally through the Supervisor of Freshman English.

Special students (those registering for six or fewer credits) need not register for Freshman English during quarters in which they are special students.

Students who enter with transfer credits should consult with the

English Department concerning the Freshman English course that they may be required to take.

All students are reminded that nine credits in Freshman English or its equivalent are required for graduation.

IV. A minimum of 43 credits must be completed in General Education distributed according to the following plan:

A. Natural Sciences: 18 credits selected from the following:

Biological Sciences: (five credits required) Biology LS 101; Bacteriology LS 111, LS 301; Botany LS 110; Entomology LS 129; Physiology LS 130; Zoology LS 160.

Physical Sciences: (five credits required) Chemistry PS 105, PS 141, PS 111, PS 112, PS 121, PS 122, PS 123; Geology PS 101, PS 111, PS 122, PS 130; Mathematics PS 130, PS 101, PS 105, PS 220; Meteorology PS 117; Physics PS 101, PS 120, PS 108, PS 111, PS 112, PS 113, PS 221, PS 222, PS 223, PS 200.

Note: At least one course must include a lab.

No more than five credits of Mathematics can count toward fulfillment of this group.

If a student can demonstrate adequate preparation, permission can be obtained to use more advanced courses to fill this group requirement.

B. Social and Behavioral Sciences: 10 to 15 credits. Credits must be selected from at least two of the following department offerings:

Agricultural Economics SS 201, SS 202, SS 220, (not more than three credits to apply); Economics SS 200, SS 201, SS 515, SS 511, SS 580; Geography SS 103, SS 123, SS 101; History SS 101, SS 102, SS 103, SS 104, SS 105, SS 170; Political Science SS 110, SS 111, SS 220, SS 440, SS 210; Psychology SS 101; Sociology SS 160 or SS 101; Anthropology SS 101.

C. Humanities: 10 to 15 credits. Credits selected from at least two of the following areas with a maximum of eight credits in any one area:

Art—HU 101, HU 165, HU 167, HU 168, HU 169, HU 365, HU 105.

English—Any literature course of lower division; any literature course of upper division with the approval of the instructor of the course.

Family Life — Food and Nutrition 122; Clothing and Textiles HU 105, HU 275; Household Economics and Management HU 349; Family and Child Development HU 120; HU 150.

Landscape Architecture — HU 103.

Languages—1) Any upper division foreign language course, with the approval of the instructor. 2) A maximum of five credits in any lower division language course.

Music — HU 101, HU 301, HU 302, HU 303, with the approval of the instructor and department head. A maximum of three credits may be drawn from the following: Music HU 125, HU 325, HU 126, HU 127, HU 327, HU 326, HU 133, HU 177, HU 178, HU 179.

Philosophy—Any lower division course; any upper division course with approval of the instructor.

Plant Science—HU 301.

Speech—HU 101, HU 201, HU 116, HU 121, HU 124, HU 181; also HU 305, HU 510, and HU 313 with the approval of the instructor and department head.

Theatre Arts—101, 102, 103; also HU 505, HU 506, HU 507 with approval of the instructor and department head.

A minimum total of 25 credits is required in Humanities and Social Behavioral Sciences.

Note: Some majors such as Engineering and Education have recommendations and modifications to these requirement. Students interested in these majors should refer to the description of the intended major in this catalog.

V. Physical Education. All students under the age of 31 are required to complete three quarters of Physical Education. Men may meet this requirement by taking Aerospace Studies or Military Science. This requirement should be completed by the end of the sixth quarter of residence work. The required courses are Physical Education 100, 160, 162 and one course selected from the following activity groups: Aquatics, Dance, Dual Activities, Team Activities, Individual Activities.

If a student takes and passes the waiver tests administered by the Physical Education Department, he may select one course from three of the five activity groups listed above in lieu of the required courses. *A student is not eligible to take the waiver tests unless he is currently enrolled in the University.*

Note: Classes used to satisfy the above requirements are not to be counted toward the major or minor.

"SILEX" Program

The SILEX Program (Student Initiative Learning Experience) was begun in 1970 to encourage student concern and interest in the content of his university education. Through SILEX students may propose and establish courses not presently offered. SILEX will provide for (1) investigation of subject matter not available in the existing curriculum, (2) investigation of new problems emerging in the world, and (3) encouragement of student initiative in learning.

SILEX courses count as electives. The number of credit hours offered will depend upon the nature of the course proposed.

The program is presently administered through the office of the Assessment of Undergraduate Education, located in the basement of the High Rise Cafeteria, Ext. 7770. Any interested students or faculty should contact this office for necessary forms and additional information.

The SILEX office will aid interested individuals in preparing a proposal. However, the responsibility of providing the following information rests upon the proposers:

(a) Course name and description: A clear description of the course should be given.

(b) Course purpose: Why is the course proposed?

(c) Syllabus: The proposers should provide a course syllabus, if possible.

(d) Instructor approval: Is a member of the faculty or another individual willing to teach on an overload basis?

(e) Class structure: Is the class to use lecture presentation

or will it be a seminar? Will it use field trips, have guest lecturers, etc?

(f) Attendance restrictions: Is the course to be restricted or limited in any way to student or community attendance? Is there a restriction to lower division, upper division, or graduate students?

(g) Student support: What is the evidence that student support exists? What is the estimated enrollment?

Upper Division Requirements

Sixty credits of upper division work are required for graduation. The completion of the group requirements in any accredited collegiate institution having a similar pattern of general education will substitute for the completion of the group requirements at this institution, as prescribed in the section *General Education.* This does not apply to students who have been pursuing prescribed courses which do not include the group requirements. If they change from a prescribed course to a major under the group elective system, they must complete the basic group requirements as specified in the section on the lower division. Transfer students who continue in a prescribed course will be held for the completion of the lower division courses as prescribed at USU, except as equivalent courses may be accepted as substitutes for our own courses.

A Freshman or Sophomore may register for upper division classes and receive credit toward senior college requirements, if such courses are recommended by his adviser and approved by the instructor. Courses so taken will count in the 60 credits of upper division required for graduation.

Major Subject. Students should select a major subject upon entering the University or early the first year, but not later than entrance in the upper division. As soon as the major subject has been selected, he should consult the head of the department in which he has decided to major. The head of the department will assign an adviser. Registration in each succeeding quarter should be carefully checked and approved by the adviser (called the major professor) to assure proper selection and sequence of courses for satisfying institutional and departmental requirements.

Major departments have the authority to prescribe not fewer than 30 and not more than 50 credits in the major subject (exclusive of any courses which may have been used to satisfy lower division requirements in any of the group). Major departments and the deans of the colleges shall also prescribe such other related courses as may be considered desirable, provided that free electives are not reduced below 36 credits.

Special consideration is granted students who pursue prescribed pre-medical, pre-dental, pre-veterinary, pre-osteopathy, and pre-legal programs for three years at

this University. If students successfully pursue further prescribed work in one of these fields for an additional year at an approved institution, they may be granted a Bachelor of Science degree by this University. These students need not comply with general major-minor requirements as previously outlined.

Minor Subjects. Students are permitted to choose their own minor. The minor consists of 18 credits either in one department or in two departments closely related in subject matter, provided that a minor taken in more than one department has the approval of the dean and the major professor.

Courses used to satisfy the English composition, the basic groups, Military Science, Aerospace Studies, or Physical Education, and Freshman orientation requirements as specified under the lower division, cannot be counted in the minimum 30 credits for a major or 18 credits for a minor.

Graduation Requirements

The University offers Certificates of Completion for two years of study in certain departments; the degrees of Bachelor of Arts, Bachelor of Fine Arts, Bachelor of Landscape Architecture, Bachelor of Music, Bachelor of Science, Master of Arts, Master of Science, Master of Business Administration, Master of Education, Master of Fine Arts, Master of Forestry, Master of Industrial Education, Master of Landscape Architecture, Master of Mathematics, Master of Music, Civil Engineer, Irrigation Engineer, Specialist in Educational Administration, Doctor of Education, and Doctor of Philosophy; and gives work to fulfill the requirements for all professional certificates issued by the State Board of Public Instruction.

The University reserves the right to change at any time the requirements for graduation, and candidates for a certificate, a diploma, or a degree, are held to compliance with such changes, so far as the uncompleted part of the course is affected.

Students are expected to familiarize themselves with institutional rules and regulations. The responsibility for satisfying the requirements for graduation rests upon them.

If students do not graduate in the class with which they entered, they are held to the requirements, including entrance, of the class with which they do graduate.

Two-Year Certificates

The Colleges of Agriculture, Engineering, and Humanities, Arts and Social Sciences offer two-year courses in practical studies leading to a Certificate of Completion for those who are not interested in the regular four-year course leading to the bachelor's degree.

In most cases the courses are arranged so that, at a later date,

the four-year course can be completed with a minimum loss of time. While these short courses are designed to develop a broader understanding of the science underlying these fields and to lay the foundations for good citizenship, they offer a considerable range of selection of practical courses in both the lower and upper divisions.

Requirements:

1) Complete 96 credits, including the required work in Physical Education, Military Science, or Aerospace Studies.

2) Complete a major of 30 credits in one or more closely related departments of the college in which the certificate is granted.

3) Complete a minor of 15 credits closely related or basic to the major subject. This need not be in the same college.

4) Complete 29 credits in the basic groups, as follows: Humanities, five; Freshman English 101, 102, 103, nine; Exact Science, five; Biological Science, five; and Social Science, five.

5) Complete 21 credits of elective work.

For additional information, see description of work in the college concerned.

In the College of Engineering definite programs of study are prescribed leading to Certificates of Completion within definite fields of applied industrial work. These curricula may be found in the catalog section on College of Engineering.

Note: A "curriculum" is a specific course of study, such as the Science curriculum in the College of Agriculture.

Bachelor Degrees

The University confers the baccalaureate degree upon students who meet the specified requirements of any of the eight resident colleges.

Graduates of the Colleges of Agriculture, Engineering and Natural Resources are awarded the Bachelor of Science degree.

Graduates of the Colleges of Business, Education, Family Life, and Science may be awarded the Bachelor of Science degree or the Bachelor of Arts degree as recommended by the student's individual department and approved by the dean of the college.

Graduates of the College of Humanities, Arts and Social Sciences may be awarded the Bachelor of Science degree, the Bachelor of Arts degree, the Bachelor of Fine Arts degree, the Bachelor of Landscape Architecture, or the Bachelor of Music degree, as recommended by the student's individual department and approved by the dean of the college.

All graduates, regardless of the type of degree, must satisfy University requirements in General Education groups, in English Composition, and in Physical Education or in Military Science, or Aerospace Studies. All students who receive the Bachelor of Arts degree must have completed two years' training or equivalent in a foreign language.

If a student is planning to graduate at the next commencement, he should consult his major professor and jointly prepare the "Admission to Candidacy" form not later than the fourth week of the Fall Quarter. He is admitted to candidacy when the plan of course work presented is found to fulfill all remaining requirements for graduation.

Summary of

Graduation Requirements

For students who will graduate at the next commencement, the following additional requirements must be met. Responsibility for satisfying the requirements for graduation rests upon the student.

1) All graduates of the state universities of Utah are required to have an understanding of the fundamentals of the history, principles, form of government, and economic system of the United States. Students may meet this requirement in any one of the following ways: a) a passing grade in a special examination; b) a passing grade in the Advanced Placement Examination in American History; c) the satisfactory completion of a major or minor in Economics, History, Political Science, or American Studies; d) the satisfactory completion of one of the following courses: History 170, History of American Civilization (5 credits); Political Science 110, American National Government (5 credits); Economics 200; General Economics (5 credits); e) courses completed in other schools equivalent to any one of the above.

2) Women must complete three quarters of Physical Education.

3) Men must complete three quarters of either Physical Education, Military Science or Air Force ROTC. If exempt from Air Force ROTC, Military Science and Physical Education, they must present one credit of other work for each quarter they have been exempt.

ROTC is a four-year program consisting of two two-year courses: Basic and Advanced. Entrance into the Basic Course is elective, admission to the Advanced Course is both elective and selective. Upon entering either course, completion thereof become a prerequisite for graduation, unless one is discharged in accordance with the provisions of Army Regulation 145-350 or Air Force Regulation 45-48 and AFROTC Manual 45-1.

4) One hundred eighty-six credits of acceptable collegiate work, including the required credits in Physical Education, Military Science or Aerospace Studies, of which a minimum of 150 credits must be "C" grade or better.

5) Sixty credits of upper division work.

6) The completion of a major, a minor, and related work as outlined under *Upper Division.*

7) The completion of the group requirements and of nine credits in Freshman English or its equivalent.

8) The maximum amount of correspondence (Independent Study) credit which can be applied toward a bachelor's degree is 45 credits.

9) Applicants for degrees who have taken courses for credit through extension class work or Independent Study courses are subject to the regular University admission requirements and must file transcripts of credit with the Office of Admissions and Records.

10) Candidates for a bachelor's degree must complete at least 45 credits in residence at USU, 15 of which must be included within the last 60 credits presented for the degree.

With the approval of the dean of the college from which the student graduates, 15 credits in courses approved for this purpose, taken in designated centers, may be counted toward the residence requirements for the bachelor's degree.

For the master's degree, at least 27 credits taken in residence are required; thesis credit counts toward the residence requirement. For the master's degree not requiring a thesis, nine credits in course work approved for this purpose taken in designated centers may be counted toward the residence requirement.

11) No more than 108 credits of transfer credit from junior colleges will be accepted toward graduation.

12) Four passing grades, "A," "B," "C," and "D," are employed in reporting credit. No credit with a grade lower than "D" can count toward satisfying credit requirements.

Grade points have been assigned to grades as follows: 4 grade points for each credit of "A," 3 for each credit of "B," 2 for each credit of "C," 1 for each credit of "D," and 0 for each credit of "F." For graduation, one must have twice as many grade points as he has credits for which grades of "A," "B," "C," "D," and "F" have been assigned. Credits of "P" grade are disregarded in computing grade point averages.

13) The candidate should file an application for graduation with his academic dean at the beginning of his Senior year. This application must show the course of study to be followed in order to complete all requirements for graduation and must be approved by: a) the professor in charge of the major subject, and b) the dean of the colleges in which the major work is done.

14) Deadlines for graduation requirements include the following: a) The candidate should file an application for candidacy for graduation with his academic dean at the beginning of his Senior year. b) Application for graduation must be submitted to the Office of Admissions and Records and the diploma fee ($5) paid before January 15. After that date a late fee of $2 will be added. c) The names of candidates for graduation will be certified by the dean of each college and submitted to the Office of Admissions and Records at least once each month beginning in October. No candidate will be accepted after May 1. d) All correspondence courses to be used toward graduation must be completed before May. e) All candidates for graduation must be cleared or removed from the list by May 15. f) Names of the candidates will appear on graduation lists and diplomas *exactly as they are on the University records.* Names will not be changed after the beginning of the school year. Name changes because of marriage, divorce, etc., cannot be shown on the diploma, since this makes it very difficult to identify the candidate with his official records.

15) The candidate must have discharged all University fees.

16) Attendance at commencement exercises is expected of all candidates. If unable to attend, one must notify the dean of his college and be officially excused in advance.

17) **Second Bachelor's Degree.** A student who wishes to qualify for a second bachelor's degree must complete a minimum of 45 credits beyond those that were required for his first standard four-year degree. *A student cannot work on two undergraduate degrees concurrently.* The candidate for a second bachelor's degree must file an application with the Office of

Admissions and Records and must secure the recommendation of his academic dean. He must also meet the requirements of the major department.

Note: The first bachelor's degree must represent a standard four-year program and must have been awarded by an accredited college or university.

Honors Program

The Honors Program, which was initiated in 1965, offers a variety of Honors courses at both the lower and upper division levels. Enrollment is limited. Students are admitted on invitation of the program director, by application to the Honors Program, or by recommendation of a faculty member of the University who has had the student in one or more classes. The program is University-wide and has students in all colleges. Upper division courses are ordinarily taught by two or more instructors representing different academic fields.

The aim is to give superior students of the University an opportunity to read, discuss, and write about significant facts and ideas, approached from a broader viewpoint than is ordinarily possible in departmental work.

The program is administered by a University-wide faculty committee representative of the different colleges and by a student committee. These committees consider such matters as curriculum development, graduation requirements, and the special activities of the program itself.

Students in the program who accumulate 45 credits of honors work and submit an acceptable senior thesis are eligible for graduation from the program.

The Honors Program is housed in the M. R. Merrill Library. The main office is located here as well as the Honors Center, a large reading lounge limited to the use of Honors students. Special Honors seminars are also held in the center.

In addition to special Honors sections of many lower division courses, the following courses are taught in the program.

Honors Courses

101. (new) Literary Experience. Close reading of selected works of literature; extensive discussion; regular papers expected to demonstrate critical insight and sound composition. (3F) **Staff**

102. (new) Philosophical Perspectives. Close reading and critical discussion of writings of philosophers, regular papers expected to demonstrate student's position on selected philosophical problems. Emphasis placed on consistency and rigor of argument. (3W) **Staff**

103. (new) Historical Perspectives. An examination of the manner in which man has met and responded to the circumstances of the world in which he lives. Examples derive from all human cultures and various time periods. Regular papers testing the validity of concepts explored are expected. (3Sp) **Staff**

300. (111) Perspectives of Contemporary Thought. A review of systems of philosophies of recent origin as to their influence on the current world. (2) **Burtenshaw**

301. (112) Roots of Modern Educational Thought. An interpretation of what constitutes the educated man, conducted as an individualized course, based on the history and philosophy of educational theory with a speculative projection into the future. (2) **B. Hansen**

302. (113) Far Eastern Thought. Oriental philosophy and literature dealing with Confucian, Taoist and Buddhist thought. Chinese art, poetry, and history are studied from ancient times to the present. (2) **Patrick, Spoerry**

303. (114) Utopia: The Ideal and Its History. A history of the utopian ideal from Plato on. Particular attention is given to 20th-century dysutopias. (2) **Skabelund**

304. (115) Frontiers of Biology. Individualized reading course designed to acquaint students with current ideas in one or more areas of biological thought. Open to all Honors students. (2) **Sanders**

305. (116) Aggression. Readings and discussions on aggression in man and lower animals and the means whereby aggression may be modified. Some biological training helpful but not essential. (2) **Stokes**

306. (117) World Population and Resource Perspectives. A socio-economic consideration of the distribution of natural resources and the relationship to world populations. (2) **Staff**

308. (121) Indian in American Literature. The Indian through American literature from colonial times to the present. Attitudes of American culture toward nature, toward primitive societies, and toward different races of people. (2) **Lyon**

309. (122) Science and Values. A critical examination of the humanism found in science. (2) **Staff**

310. (124) Black American Literature. This course is intended, generally, to make students aware of the millions of Americans who, being Black, are largely neglected within the context of national culture. Specifically, it is intended to introduce students to writers who represent the styles, thoughts, and movements that underlie the literary culture of Black America. (2) **C. Beyers**

311. (125) Classical Mythology in Western Art. An examination of certain myths of the Greeks and Romans as artistically employed or recreated in selected paintings, sculpture, music, and literary works produced in western civilization. (English 126 is recommended). (2) **R. Smith**

312. (126) Of Men and Machines. An investigation of a variety of aspects of the complex relationship between men and machines, with a continuing emphasis on the impact upon western culture of the technological society in the areas of values, environment, and art. (2) **C. Beyers**

313. (127) Latin America Seminar. An introductory approach to Latin American cultural, historical and political problems. Multiple disciplinary approach with staff from different departments participating in the teaching. (2) **Furlong**

314. (128) Love Seminar. Reading and discussion of the different aspects of love as found in the classic, Christian, romantic, Freudian and humanistic traditions. (2) **Crawford, Sanders**

315. (129) Russian Literature Colloquium. A study of Russian novelists Pushkin, Gogol, Dostoevsky, Tolstoi, Pasternak, Turgenev and Solzhenitsyn. **Patrick, Spoerry**

316. (119) Theory of Tragedy. Survey of the history of tragedy in western culture from the classical Greek to the present. Emphasis will be placed on drama. (2) **Staff**









COLLEGES

Colleges

College	Dean	Room
Agriculture	Vearl R. Smith	Ag Science 223A
Business	Robert P. Collier	Business 210
Education	Oral L. Ballam	Education 203
Engineering	Dean F. Peterson, Jr.	Engineering C110
Family Life	Phyllis R. Snow	Family Life 201B
Humanities, Arts and Social Sciences	M. Judd Harmon	Main 131
Natural Resources	Thadis W. Box	For-Zool 106
Science	Ralph M. Johnson	For-Zool 101

College of

Agriculture

Dean Vearl R. Smith

Associate Dean Doyle J. Matthews

Office in Agricultural Science 223A

The College of Agriculture has the following departments, majors and degrees:

Agricultural Education—Agricultural Education, Agricultural Machinery Mechanization; BS, MS, Two-year Program Certificate of Completion

Animal Science — Animal Science, Animal Breeding, Nutrition, Physiology, Management; BS, MS, PhD

Dairy Science — Dairy Science with emphasis in Science, Business or General Dairy Science; BS, MS, PhD (in the Interdepartmental Nutrition Curriculum)

Economics — Economics, Agricultural Economics; BA, BS, MA, MS, PhD

Food Science and Industries — Food Science and Industries, joint major in Food Science and Industries and Business Administration; BS, MS

Plant Science — Agronomy, Crop Management, Crop Physiology, Horticulture, Plant Breeding, Plant Nutrition, Plant Science, Weed Science; BS, MS, PhD

Soils and Meteorology — General Soils, Industrial Soils and Agricultural Chemistry, Soils and Irrigation, Soil Science, Biometeorology and Climatology; BS, MS, PhD

Veterinary Science — Veterinary Science; BS

Agriculture today is a dynamic, rapidly changing industry. There are few fields of work that can offer such interesting and challenging opportunities. Agriculture includes much more than farming or producing food and fiber. It includes all the occupations connected with the production, processing, and distribution of farm products.

Agriculture is the nation's largest industry. Of the 65 million people employed in the United States, about 26 million (40 percent) work in agriculture, nearly eight million of these (12 percent) work on farms, seven million produce for and service farmers, and 11 million process and distribute farm products. In addition, about a half million scientists serve agriculture directly or indirectly. The agricultural industry is the biggest buyer, seller, and borrower in the United States — and it has the biggest investment. It uses more steel, rubber, petroleum, trucks, tractors, and more electricity than any other industry.

Today's agriculture offers students unlimited opportunities. But it is highly competitive, and to be fully successful one must be well trained.

USU is equipped to help one qualify for special positions as well as to gain a broad general education in the basic sciences and in the humanities. Its staff and facilities provide preparation for an interesting and profitable career.

Staff members of the Agricultural Experiment Station are devising better methods of feeding and cropping and are developing more valuable strains of fruits, crops, and livestock, and more remunerative systems of marketing agricultural products. These activities are studied by the student firsthand, and student employment enables many to take active part in the research work of the Experiment Station. This arrangement gives a clear insight into scientific methods and valuable practical experience. Attention is given to improve methods in farming operations, in use of tools and machinery, and in management of livestock and crops.

The great practical value of the various curricula of the College of Agriculture is shown by the records of graduates who have gone back to the farm, or have become specialists and teachers or investigators, and have become leaders in their chosen work.

Facilities and Equipment

The Agricultural Science Building houses the administrative offices of the College of Agriculture, the Agricultural Experiment Station, and the Extension Services. The Departments of Animal Science, Plant Science, Agricultural Education, and Soils and Meteorology are also housed in this building.

The Dairy Science and Industries Departments are housed in the Animal Industry Building. Veterinary Science occupies a separate building.

The various departments in the College of Agriculture are well equipped and have up-to-date facilities for teaching and conducting research in modern scientific agriculture. **Animal Science** provides modern chemical laboratories, an animal metabolism building, a new meats and physiology laboratory, and a new livestock pavilion. Outstanding groups of beef cattle, sheep, swine, poultry, and horses offer real advantages to students in relating natural sciences to efficient production of livestock and poultry. **Dairy Science** operates a dairy farm for student instruction, experience, and research. Students gain experience in these facilities and most are employed for a portion of the time in these or in the research and teaching laboratories associated with them. **Food Science and Industries** operates a food processing and pilot food processing plant. Many fine pieces of equipment are available in these plants for instructional and research purposes. The principles of processing food products and the development of new and better processing methods are sought continuously.

Plant Science is noted for its modern, well-equipped laboratories, growth chambers, greenhouses, and is complemented by eight experimental farms located throughout the state to give students unique opportunities to learn. This department provides students with opportunities to apply knowledge of physical and biological science to the growth and production of plants. **Soils and Meteorology** is recognized for the excellence of its laboratories for studying soil and water conservation and utilization. The influence of soil and atmospheric environment on plants, and animal growth and behavior are intensively studied. Controlled environmental chambers, flame photometers, atomic adsorption spectrophotometer, gas chromatograph, Geiger counters, meteorological equipment, potentiometer, bridges, controller, and recorders are ex-

amples of equipment which students learn to build, maintain, and use. **Veterinary Science** has equipment and facilities available for teaching and research in histopathology, in physiologic pathology, in the use of embryonating eggs for bacterial and viral culture and toxicology, and in tissue culture techniques. These endeavors are supported by necropsy, diagnostic, and experimental animal laboratories.

Agricultural Economics, in the Department of Economics and jointly administered by the Colleges of Agriculture and Business, is outstanding in its training of students desiring economic or business orientation in agriculture. Students are provided with calculators, and electronic computers are made available through arrangement with the University Computer Center. Through such facilities students may become acquainted with the modern methods of data analysis such as linear programming, used in various ways in studying the effects of various factors on the economic outcome of problems. **Agricultural Education** involves students in modern agricultural science and also cooperates with teachers of Vocational Agriculture in 43 high schools in the preparation of teachers and in furnishing classrooms, shops and laboratories. A non-degree program in the department trains students for occupations in agricultural machinery and equipment fields.

Curricula in Agriculture

Students may work toward the Bachelor of Science degree in the Departments of Agricultural Education, Animal Science, Dairy Science, Food Science and Industries, Plant Science, and Soils and Meteorology. Pre-veterinary training is given in the Veterinary Science Department.

Three basic curricula that may be offered by departments are: 1) science, 2) general or production, 3) business. Departmental listings detail the requirements for these curricula.

Science

Students who choose the science curriculum are taught the fundamentals of physical and biological sciences that are significant to agriculture. They gain a solid base of science courses that prepares them for graduate work and eventually research and teaching careers in the natural sciences. Graduates in this curriculum are also prepared to do research or technical work in agriculturally oriented fields such as the chemical industry, as related to fertilizers and pesticides; livestock health; feed industry; crop breeding; water use; and technical aspects of food processing. Science curricula must meet the following minimum requirements:

Courses	Credits
Physical Sciences	45
Biological Sciences	15
Humanities	10-15
Social and Behavioral Sciences	10-15
English 101, 102, 103	9
MS, AS, or PE	3

A science curriculum is offered in the Departments of Animal Science, Dairy Science, Food Science and Industries, Plant Science, Soils and Meteorology, and Veterinary Science.

General or Production

This curriculum is designed to educate young people to meet the special demands of today's farming. Successful modern agricultural production requires an understanding of the latest relevant scientific knowledge and an ability to apply the information in

the field. A student who plans to farm, to be a farm manager, to work directly with farm operators as a businessman, or as a government or farm organization employee, will probably satisfy his needs by taking the production curriculum. General curricula must meet the following minimum requirements:

Courses	Credits
Physical Sciences	23
Biological Sciences	15
Humanities	10-15
English 101, 102, 103	9
MS, AS, or PE	3
Social and Behavioral Sciences	10-15
Agricultural Economics or equivalent	9
One Animal Science, one Plant Science, and one Soils class	9

This curriculum is offered in the Departments of Agricultural Education, Animal Science, Dairy Science, Plant Science, and Soils and Meteorology.

Business

The businesses and industries that buy from and sell to farm people are expanding and need men and women trained in agriculture. These enterprises include feed, fertilizer, machinery, and chemical firms that supply the farmer's needs, as well as marketing firms that assemble, process, ship, and merchandise his products. Managers of large-scale farm enterprises also profit from the kind of education provided by the business curriculum. Students who want to capitalize on their agricultural background while pursuing a business or industrial career, should choose the business option. Business curricula students must meet the following minimum requirements:

Courses	Credits
Physical Sciences	23
Biology	10
Social and Behavioral Sciences, Business	27
Humanities	10
MS, AS, or PE	3
English 101, 102, 103	9

This curriculum is offered in the Departments of Economics, Animal Science, Dairy Science, Food Science and Industries, Plant Science, and Soils and Meteorology.

Interdepartmental and intercollegiate cooperation has and will continue to facilitate the development of various other curricula. Students should not hesitate to inquire about the possibilities of following a curriculum that would allow for certain special needs.

A Minor in Journalism

A minor in Journalism for Agriculture majors has been approved. It consists of 18 credits in Journalism courses as follows: Journalism 121, Introduction to Journalism; Journalism 230, Reporting; plus 10 credits selected from: Journalism 430, Feature Writing; Journalism 352, Publicity Methods; Journalism 431, Television and Radio Writing; Journalism 231, Editing; and Journalism 310, Journalism Practices.

Graduate Study

Graduate work is available in all departments of the College of Agriculture.

Interdepartmental Major in International Agriculture

Two-thirds of the people now inhabiting the earth live with the increasing reality of intense hunger and malnutrition. An incredible 60-80 percent of the workers in these areas labor at agriculture. But illiteracy, insufficient capital, a deficiency of technical and managerial skills, and the lack of teachers condemn them and most of their countrymen to perpetual despair. Each day of life must be dedicated to the search for enough food to sustain that life. Without an im-

mense introduction of know-how, wrapped in patient understanding of local psychology and problems, food production by the world's hungry nations will never equal their need.

The world's more than 80 underdeveloped countries and territories are being helped today by trained people offering technical assistance. Whether they come from Europe, the United States or some other area, such people provide better assurance of world peace than can the most efficient army. Non-deficient nations are realizing that merely supplying commodities tends to stifle initiative in the deficient nations and stunts their potential development.

The University's International Agriculture Advisory Committee considers any of three skills particularly likely to produce a meaningful contribution within a foreign country. These are: 1) agronomy, 2) animal science, and 3) agricultural economics. The USU major in International Agriculture allows students to major in any one of these three crucial topics. Individuals competent in any of these fields are in demand in all underdeveloped countries. Graduates in International Agriculture will find a ready market for their services. Students who have enjoyed experience in foreign lands and have facility with a foreign language might find the International Agriculture major an especially rewarding choice. They either have developed or at least know that they can develop the social and psychological attitudes prerequisite to success in foreign service.

To assure that all candidates for a degree in International Agriculture acquire the essential social and cultural background, a core curriculum of courses is required of all students regardless of technical option. This curriculum and the specific requirements for each technical option are given below:

CORE CURRICULUM

Courses	Credits
English 101, 102, 103	9
Physical Education	3
Exact Sciences	23
Biological Sciences	10
Humanities	15
Must include: Language[1]	10
Social and Behavioral Sciences	21
Must include: Geography 314, 302 or 307	3
Political Science 110 or 220	3-5
Sociology 101 or 420	3-5
Anthropology 101 or 150	3-5
Ag Economics 201, 202 and 220 or equivalent	9
Agriculture and Agriculture Related	33
Must include: Animal Science 240 or equivalent	5
Plant Science 100 or equivalent	4
Soils 358	4
Ag Education 351 and 301 or 303	8
Veterinary Science 120 or 300	4-5
Agricultural Entomology 539	5

Specializations

Animal Science

Animal Science 102, 167, 261, 262, 100, 560, 561, 562, 520, 440, 441, 442, 450 and 470	35
Food Science and Industries 160	5
Dairy Science 120, 310, 311	8
Additional Biology	10
Veterinary Science 520	3
Ag Engineering 110 or 310	3-4
Plant Science 432	3

Agronomy

Meteorology 117	3
Soils 470, 555, and 556	7
Soils 514 or 565 and 566	4-5
Plant Science 440, 450, 350, 432, 433, 555, 565	24

Agricultural Economics

Economics 301, 500, 560 and 580	16
Business Administration 201, 511, 489, 550, 560 or 540	10
History 104, 105	10
Humanities (electives)	10
Ag Economics 510, 550, 532, 535, 560, and 580	18
Electives	12

[1]English for non-English speaking students.

College of

Business

Dean Robert P. Collier
Assistant Dean William V. Tezak
Office in Business 202-210

The College of Business has the following departments, majors, and degrees:

Accounting—Accounting; BA, BS, MAcct

Aerospace Studies — ROTC Commission

Business Administration — Finance, Marketing, Personnel and Industrial Relations, Production Management; BA, BS, MBA

Business Education and Office Administration — Composite in Business Education, Composite in Distributive Education, Office Administration, Combination of Office Administration and Family Life; BA, BS, MS, EdD

Economics — Economics, Agricultural Economics; BA, BS, MA, MS, PhD

Military Science—ROTC Commission

The American economy today provides an unusual opportunity for enterprising managers and businessmen. In a free enterprise economy such as ours, the decisions of the business world are made by individual managers, administrators, and owners of business. The very course of our national progress and prosperity is determined by the decisions and actions of businessmen. As never before, we need leadership in this area. We are currently challenged by an alternative approach—totalitarian state planning. We are beset by many economic and business problems—inflation, lack of growth, etc. If our system is to survive and grow, dynamic, imaginative leadership is needed in the business world; and great rewards await those who can provide this leadership.

The program offered in the College of Business combines highly specialized training in many professions, i.e., auditing, accounting, financial management and the like, with many broad, general, educational programs important to all people. All Business majors are required to take at least 40 percent of their course work outside of this college in areas such as social science, psychology, mathematics, physical sciences, humanities, etc., to insure a broad and varied background. To guarantee the desired amount of specialization, all majors in this college are required to complete a required core curriculum and at least 40 percent of their total program within the college in Business and Economics. This is intended to provide a balance between broad-gauge general education and the specialization required for success in the business world.

The purpose of the College of Business is to provide an education that is practical and realistic, preparing men and women to take an active part in the main stream

of our society so that our progress and prosperity will grow in the years ahead.

Minor in Business. In addition to a wide range of formal majors, the minor in Business is popular with students majoring in other colleges such as Agriculture, Natural Resources, Engineering, etc. Opportunities for establishing private businesses exist in many areas, and business training proves to be of great importance to successful farming, consulting, or technical fields. This is especially true in agriculture where the combination of technical training and business management training provides an opportunity to major in Agri-business. (See page 42. Additional training linking management training with natural resource development is strongly recommended by the College of Natural Resources. With the vast majority of our University graduates finding employment in the business world, some general familiarity with business techniques and management skills is of great importance to the majority of our University students. A competence in business is useful to every successful man and woman.

The combination of Computer Science and Business is proving to be increasingly popular, and this combination is described on page 117.

Numerous international programs also depend heavily upon administrative and management skills.

Career Opportunities. Courses in the College of Business provide the foundation upon which to build significant careers in such occupations as the following: business executive, accountant or CPA, secretary, lawyer, salesman, marketing expert, personnel manager, high school teacher, banker, economist, politician or government worker, foreign service, econometrician, office manager, investment broker, operations analyst, production manager, investment counselor, college professor, public administrator, independent businessman, etc.

Graduation Requirements. To graduate in the College of Business, a grade point slightly higher than the University minimum is required—with 2.2 being required in the major in Accounting and Business Administration, while the successful business educator should aspire to a 2.5 grade point to be fully accepted in educational circles. To insure that the specialized work taken during the Senior year is fully acceptable to the departments, the College of Business has the additional requirement that the Senior year must be taken in residence at USU.

The College of Business is affiliated with the American Association of Collegiate Schools of Business, being a member of the Assembly of that association.

The College of Business is housed in a new "skyscraper" office building just east of the Library. Five floors of faculty offices rise above three floors of classrooms, topped by a faculty lounge in the penthouse with a million-dollar view. The latest designs in case-study rooms, flexible teaching areas, seminar rooms, and electronic equipment are installed.

Financial Aid. Many significant scholarships are available to students majoring in Banking and

Finance, Economics, Accounting and other areas in the college. The top ten percent of the graduating class is awarded membership in the honorary scholastic fraternity of Phi Kappa Phi. Internships are also available in Accounting.

Graduate work is available in all departments in the college.

Management Institute

Director Calvin D. Lowe
Office in Business 408

The Management Institute is organized to care for the management training needs of business and industrial firms, provide consulting services, and conduct research projects locally, nationally, and internationally.

In its unique position the Management Institute is able to provide interested groups with a luncheon speaker or engage in a three-year project in Brazil. Seminars are conducted both on the USU campus and at the sponsor's plant site. Services can be made available to industry in any city throughout the nation offering the same high quality programs as those conducted on campus at the lowest possible price.

The Management Institute recognizes the interrelationship between industrial personnel and University professors. The "total" instruction that takes place when experienced participants meet with academically trained, work experienced seminar leaders benefits the University as well as the business/industrial community, and provides insights essential for a better informed staff in a growing College of Business.

College of

Education

Dean Oral L. Ballam
Assistant to the Dean, Extension and Public Services Orson Tew
Office in Education 203

The College of Education has the following departments, majors, and degrees:

Communicative Disorders — Clinical Audiology, Educational Audiology, Speech Pathology; BS, MS

Educational Administration — Educational Administration; MS, MEd, Specialist in Educational Administration; EdD

Elementary Education — Elementary Education; BA, BS, MA, MEd, MS, EdD

Health, Physical Education and Recreation — Physical Education, Health Education, Recreation Education; BS, MS

Instructional Media—Instructional Media Specialist; MEd

Psychology—Psychology; BA, BS, MA, MS, MEd, EdD, PhD

Secondary Education — Secondary Education; BA, BS, MA, MS, MEd, EdD

Special Education—Mental Retardation (undergraduate), Gifted, Mental Retardation, Learning Disabilities, Compensatory Education, Behavior Disorders (graduate); BS, MEd, MS

Educating boys and girls is one of the most challenging, exciting, and deeply satisfying of all professions. Over one-fourth of the citizens of our nation attend a school of one kind or another each day. With nearly two million elementary and secondary school teachers in the United States today, more than 250,000 teaching positions must be filled by trained teachers each year.

A teacher's work vitally affects not only today's young people, but also the future of our nation and the world. The future of mankind is linked to the education of youth as individuals and as groups in striving to improve situations and bring about creative solutions to problems.

In this regard, the College of Education has several principal functions. It prepares teachers, administrators, supervisors, and other professional personnel for the public schools; and through graduate programs leading to advanced degrees it prepares college teachers. In addition, the Department of Psychology, Department of Health, Physical Education and Recreation, Department of Communicative Disorders and the Department of Instructional Media have curriculum programs for the preparation of professional specialists in fields other than in Education.

In addition to offering majors and minors, each department offers courses contributing to general education as well as courses designed to supplement the major work of other departments in the University.

The College of Education is a member of the American Association of Colleges for Teacher Education and is accredited through the doctoral degree by the Nation-

al Council for Accreditation of Teacher Education.

Teacher Education. The University offers complete programs of Teacher Education in all phases of public school work. Cooperative programs with other departments of the institution provide for teaching majors and minors required of all prospective secondary school teachers. Similarly, general areas of concentration in subject matter are required of all elementary teachers.

Careful attention is given to Education. Specially selected personnel at all training levels give students individual guidance.

Facilities include the Nursery School, operated on the campus by the Department of Family and Child Development in the College of Family Life. Here Teacher Education focuses on the preschool child.

The Edith Bowen Teacher Education Laboratory School is a functioning elementary school on the University campus, serving as a research and demonstration center in Elementary and Special Education. The teachers of the school are members of the University faculty. Scheduled observations of classroom activities by college students are part of the requirements of related courses such as Child Psychology, Curriculum Development, Principles of Teaching in the Elementary School, Educational Psychology, and Library Science.

Admission Requirements to Teacher Education. Admission to the professional education curricula requires formal action by a faculty committee on admission to teacher education. The latter procedure applies to all curricula leading to graduation from any department and college in the University, wherein recommendations for professional certification in education are concerned.

A student is not permitted to enroll in professional courses in Education unless he has been admitted to the Teacher Education program. This requires a demonstration of proficiency in the areas of speech, hearing, and general communication as well as a minimum grade point average of 2.25. The same grade point average must be maintained for admission to student teaching and for certification.

Application for admission to professional curricula should be made before the end of the Sophomore year. Transfer students who have had one year of collegiate work may apply during the first quarter at USU.

Teacher Certification. The College of Education is designated by the Utah State Department of Public Instruction as the official representative of USU in administering certification requirements for students.

The University provides training to prepare students for all of the professional certificates issued by the Utah State Department of Public Instruction. Teaching specialties for which certificates may be issued are listed within the departmental information sections.

Specific requirements for each certificate may be obtained from the office of the dean of the College of Education or from the department in which the major work is offered.

As a valuable and integral part of Teacher Education for the elementary or secondary certificate, a closely supervised program of student teaching is conducted. Student teaching is done in se-

lected public schools throughout the state. The student should be financially prepared to stay off campus during the quarter which he has selected as his professional quarter of student teaching.

The Bachelor of Science degree with a major in Elementary or Secondary Education is designed for the student preparing to teach in either of these fields. Students majoring in other departments of the University who wish to prepare for teaching are admitted to Teacher Education curricula as heretofore described. Application must be made to the Teacher Certification Office of the University to obtain a teaching certificate.

Dual Certification. A student desiring to obtain both the elementary and the secondary certificates should consult with an adviser in the Education departments early in his program. Ordinarily, dual certification will require at lease one additional quarter of work.

Graduate Study. Programs at the graduate level are offered for students who desire to meet requirements for administrative, supervisory, teaching, or other advanced professional certificates. The MEd, MS, MA, EdD, and PhD degrees, as well as the Specialist in Educational Administration degree requiring a two-year sequence in graduate work, are offered. The College of Education also cooperates with the College of Engineering in providing a program leading to a Doctor of Education degree in Industrial Education. More detailed information concerning graduate work is found in the Graduate School section of this catalog. A separate catalog describing graduate programs is issued by the School of Graduate Studies.

Teacher Placement Service. The University is interested in placing its graduates in professional positions. To accomplish this purpose in the College of Education the Teacher Placement Service functions as an integral part of the University Placement Center. If students qualify for a teaching or other professional certificate, they must register with the service as a help in compiling the proper credentials to be used in placement. Application for membership should be made prior to student teaching whenever possible. No fee is charged for membership in the center.

College of

Engineering

Dean Dean F. Peterson
Associate Dean Larry S. Cole
Associate Dean Irving S. Dunn
Director, Engineering Experiment Station Clayton Clark
Director, Electro-Dynamics Laboratories Doran J. Baker
Director, Space Science Laboratories Kay D. Baker
Director, Utah Water Research Laboratory Jay M. Bagley
Controller's Representative Ray Larsen
Office in Engineering C-110

The College of Engineering has the following departments, majors, and degrees:

Agricultural and Irrigation Engineering — Agricultural Engineering, Irrigation Engineering, Irrigation Science; BS, MS, PhD

Civil Engineering—Materials and Transportation, Water Supply and Quality Control, Structures, Water Resources, Hydrology, Hydraulics and Fluid Mechanics, Soil Mechanics; BS, MS, PhD

Electrical Engineering — Electrical Engineering; BS, MS, PhD

Industrial and Technical Education —

1) Industrial and Technical Teacher Education — Industrial Arts, Technical, and Vocational Teachers Educations; BS, MS, MIE, EdD

2) Industrial Technology—Aeronautical, Automotive and Diesel, Drafting and Welding Technology; Two-year Certificate of Completion in Technology and BS

Manufacturing Engineering — Manufacturing Engineering; BS, MS

Mechanical Engineering — Mechanical Engineering; BS, MS, PhD

The College of Engineering offers educational programs for professional development in Engineering, in Industrial and Technical Teacher Education, and in Industrial Technology. Besides providing modern and thorough professional education, the college's curricula are designed to give attention to the liberal aspects of a college experience.

Briefly, the purposes of the college are: 1) to provide students with a professional competence which will enable them to enter and progress rapidly in their professional careers; 2) to provide an understanding of the physical and social world in which they live; and 3) to provide a basis for continued intellectual growth, socially and professionally.

The college emphasizes progress, and its program is under constant review and improvement in order for its graduates to become leaders in a society which is rapidly changing technologically and socially. Emphasis is also placed on research and innovation. A large and versatile fac-

ulty, most of whom have doctoral degrees, has been chosen on the basis of teaching and research competence, and professional reputation.

In **Engineering,** degrees lead to employment as professional engineers in such fields as aeronautics, agriculture, astronautics, communications, electronics, highways, hydraulics, industrial engineering, instrumentation, irrigation, municipal engineering, power systems, transportation, water supply, etc.

In **Engineering,** the course of study includes Mathematics and basic Science, Engineering Science, Engineering Analysis and Design, English, Humanities, and Social Studies. A reasonable choice of elective subjects is provided. If graduate study in Engineering is planned, additional Mathematics and Physics should be taken.

The objectives of the undergraduate Engineering curricula are to provide thorough, fundamental, technical education necessary for professional Engineering work of the highest grade, and to assure the development of those physical, intellectual, moral, and social qualities, essential to high professional achievement. The recommendations of the Engineers' Council for Professional Development have been carefully considered in planning the Engineering curricula, and the curricula in Agricultural and Irrigation, Civil, Electrical, and Mechanical Engineering are accredited by that agency.

The Department of Industrial and Technical Education includes two programs:

1) **Teacher Education** which provides the specialized and general training to prepare and qualify teachers for positions in Industrial, Technical, and Vocational Education programs in the public school systems and industry.

The Industrial Arts Teacher Education major provides the training for teaching positions in junior and senior high schools. The curriculum encompasses eight technical areas which meet state certification requirements. The BS, MS, and MIE degree programs are offered in the Teacher Education programs. The EdD degree is offered jointly with the College of Education.

2) The program in **Industrial Technology** — Aeronautical, Automotive and Diesel, Drafting, and Welding — provides both the specialized training and general education to qualify graduates for high-level technician positions in industry.

For Industrial and Technical Education, admission requirements are the same as for general admission to the University.

For Engineering, the following high school credits are required for admission without deficiencies: English, 4; Plane Geometry, 1; Algebra, 2; Trigonometry, ½; Physics or Chemistry, 1. One credit each of Physics and of Chemistry and ½ credit of Mechanical Drawing are recommended. Foreign language in junior or senior high school is desirable. More than four years will be required for deficient students to complete the bachelor's degree, except that minor deficiencies may be removed by attendance at Summer Quarter. See "Common Freshman and Sophomore Curriculum for Engineering." Students having major deficiencies may be placed in a pre-Engineering program agreed upon by the dean. Such students may write to the dean regarding this program.

Academics. An average of "C" (2.0 g.p.a.) or higher is required to remain in good standing and to be eligible for graduation. In addition, a grade of "C" or better is required in all courses in the student's major field and in the supporting science courses in Mathematics, Physics and Chemistry.

Graduation. Candidates in Engineering must satisfy the general University requirements and those of the Engineers' Council for Professional Development, including:

1) Three quarters of PE or ROTC courses

2) Economics 200

3) A minimum of nine credits in two or more areas of Social Sciences:

a) Sociology 101, Anthropology 101

b) Economics 200, 201

c) Psychology 101

d) Political Science 110, 210, 440

e) History 101, 102, 103, 104, 170

f) Geography 101, 103, 123

4) A minimum of nine credits in two or more areas of the following Humanities:

(maximum of eight credits in any one area)

a) English literature courses

b) Foreign literature courses

c) Music 101, 301, 302, 303

d) Theatre 101, 102, 505, 506, 507

e) Art 101, 165, 167, 168, 169

f) Philosophy 101, 210, 522

5) A total of at least 24 credits in (2), (3), and (4).

Candidates in the Department of Industrial and Technical Education must meet the general University group, PE/ROTC, and American Institutions requirements as listed elsewhere in this catalog.

Graduate Study. All departments in the college offer graduate study programs leading to the MS degree and the PhD or EdD degree. For further information and details, see the Graduate Catalog.

Engineering College Honors. An Honors Program provides an opportunity for outstanding students to participate in advanced study or creative investigation beyond the prescribed curricula. See course no. 497 in the departmental listings.

Professional Societies. The college holds institutional memberships in: American Society for Engineering Education, American Society for Testing Materials, American Concrete Institute, and Highway Research Board. USU holds membership in the Universities Council on Water Resources.

Student Chapters or Societies include: American Society of Civil Engineers, Institute of Electrical and Electronic Engineers, Society of Manufacturing Engineers, American Society of Mechanical Engineers, Sigma Tau, Theta Tau, Industrial-Education Club, Society of Automotive Engineers, American Welding Society, and Flying Techs-Aeronautics.

Students are encouraged to affiliate with appropriate student societies.

The Engineering Council is comprised of a student and a staff member from each department and the dean's office. The college senator is chairman. The council meets regularly to provide effective student-staff-administration liaison.

ROTC. Many Engineering students find satisfaction in serving

their country in the Reserve Officers Training Program and as reserve officers after graduation. Junior and Senior ROTC students receive compensation equivalent to a substantial scholarship. See "Military Science and Aerospace Studies." Professor William L. Jones, Engineering Building, is the faculty adviser to assist Engineering students desiring to take ROTC.

Water Engineering. An integrated graduate program is offered in Water Engineering under the Departments of Agricultural and Irrigation Engineering and Civil Engineering. See catalog write-up under these departments. Majors are given in Hydraulic Engineering, Hydrology and Water Resources Engineering, Water Quality Engineering and Irrigation, and Drainage Engineering.

Master of Engineering Science. USU cooperates with the University of Utah and Brigham Young University in offering a program leading to the degree of Master of Engineering Science. See "Graduate Studies" in this catalog. Prescribed courses, as outlined below, are accepted by all three cooperating universities for this degree, without restriction. Candidates must satisfy the admission requirements, examination procedure, and all other regulations of the Graduate School except as above amended. The thesis must satisfy the requirements of the student's committee and his thesis director.

Following are the prescribed common courses:

Master of Engineering Science Curriculum

Common Courses	Credits
Numerical Methods and Computers	4
Intermediate Mathematics (Math 441, 442, 443)	9
Modern Theoretical Physics (Physics 471, 472, 473)	12
Engineering Science of Materials	3
Advanced Transport Phenomena (ME 635)	6
Design Problem or Thesis (ME 697)	3-9
Approved Electives (See Master of Engineering Science brochure)	2-8

Scholarships, Fellowships and Assistantships. A number of scholarships and assistantships are available to Engineering College students. Interested high school seniors are encouraged to write to the dean regarding these. See "Awards, Honors, Scholarships, and Grants-in-Aid." There are also opportunities for employment on research projects and other activities.

Graduate Assistantships and Fellowships. A number of excellent graduate assistantships, fellowships and scholarships are available in all departments. Assistantships are available both for teaching and research. Application should be made directly to the department concerned.

Research. The College of Engineering maintains an extensive program of research through the Engineering Experiment Station and the various departments. There are opportunities for graduate students to participate, and many undergraduates can find employment in research programs.

Electro-Dynamics Laboratories. These laboratories, which include the Stewart Radiance Laboratory located in Bedford, Massachusetts, are conducting research programs in electro-optics, cryogenic infrared measurements, aerospace instruments, and data communications. The laboratories employ faculty, graduate students, and undergraduate students, primarily from the Colleges of Engineering, Science, Business and Education. Studies of the atmospheric environment are performed in con-

cert with the Center for Research in Aeronomy.

Space Science Laboratory. Functioning under the Center for Research in Aeronomy, this group conducts research in the areas of atmospheric and space science. Studies are conducted in conjunction with atmospheric disturbances such as auroral events, polar cap absorption, solar eclipses, and sudden ionospheric disturbances. Excellent opportunities are available for students and staff to participate in this area of research.

Utah Water Research Laboratory is devoted to research in all areas of water resources, quality, and weather modification, in close cooperation with the Departments of Civil Engineering, Agricultural and Irrigation Engineering, and related departments in other colleges.

General Engineering Courses

Students in the Agricultural and Irrigation, Civil, Electrical, Manufacturing, and Mechanical Engineering curricula take the same courses during their Freshman and Sophomore years. However, the curriculum is sufficiently flexible so that transfer students are readily accommodated. Junior and Senior year courses of study are listed under the major departments.

Most of these courses are available every quarter, including Summer.

General Engineering

101. (1) Introduction to Engineering. A study of basic engineering problems and their solutions; design procedures; experimental techniques and measurements. (2F, W) **Staff**

102. (2) Slide Rule Instruction. Practice in the use of the Log-Log slide rule. Prerequisite or concurrently: Math 136. (1F, W, Sp) **Staff**

103. (3) Digital Computer Utilization for Engineering Students. Introduction to the use of digital computers in engineering problem solving and data processing utilizing assembly processer languages. Prerequisite: Math 105. (2F, W, Sp) **Staff**

Engineering Common Core Curriculum

FRESHMAN	Credits		
Courses	F	W	Sp
[1]Math 105, 220, 221	5	5	5
[2]Chem 121, 122, Physics 221	5	5	5
English 101, 102, 103	3	3	3
Gen Engrg 101; Mech Engrg 120	2	4	
[3]MS, AS, or PE	1	1	1
Totals	16	18	14

SOPHOMORE	F	W	Sp
Math 222, 223, 324	5	5	3
Physics 222, 223, Elec Engrg 261	5	4	5
Mech Engrg 170, Civil Engrg 200	3	3	
Civil Engrg 202			5
Humanities, Econ 200, Gen Engrg 103	3	5	2
Totals	16	17	15

[1]Qualified students, based on high school math grades, ACT scores, and a math exam, may start with Math 220.

[2]Chemistry 121 and 122 may be postponed until Winter and Spring, and take Economics 200 or a Humanities course Fall quarter after consultation with adviser.

[3]MS and AS courses are two credits per quarter.

[4]See list of approved Humanities.

College of

Family Life

Dean Phyllis Snow

Office in Family Life 201

The College of Family Life has the following departments, majors, and degrees:

Clothing and Textiles — Optional Clothing and Textiles with emphasis of General Clothing or Textiles or Fashion Design and Merchandising; BS, BA, MS, PhD

Family and Child Development — Marriage and Family Relations, Child Development; BS, MS

Food and Nutrition — Food and Nutrition; BS, MS, PhD

Home Economics Education — Home Economics Education Composite for Secondary School Teaching; BS, MS

Household Economics and Management—Household Economics and Management; BS, MS

Family Life is one of the most important fields of learning in our civilization. It is the field of knowledge and service primarily concerned with educating the individual for family living; improving the services and goods used by families; conducting research to discover the changing needs of individuals and families and the means of satisfying these needs; and of furthering community, national, and world conditions favorable to family living.

Family Life provides the research and education which enhances and preserves our culture and our skills in the vital areas of food, clothing, shelter, and family nurture.

Today, many of the activities formerly assigned to the home have become industrialized, and increasingly the family is a unit of consumption. Thus, management of family resources, the development of individuals within the family, and the establishment of family-community relationships have become more important than the production of goods and services. The growth of service industries requires that Family Life specialists increasingly apply their knowledge in institutional settings. Preparation for professional competency has become a major function of Family Life programs.

All qualified specialists in the field of Family Life are college graduates and many hold advanced degrees.

Career Opportunities

Graduates from the College of Family Life are much in demand as teachers in facilities for children, in home economics education programs in the secondary schools, and in the specializations at the college level; as extension home economists, consultants and educators in social welfare programs, dietitians, public utility home economists, research workers or technicians in research laboratories; as business home economists with food, equipment, housing, and textile companies; as designers of clothing, and textiles; as executives in clothing

and home furnishings businesses; as consultants for radio and television, and as members of editorial staffs of magazines and newspapers. They are planning the food for the crews exploring outer space and cruising under the seas, aiding in the rehabilitation of the world's handicapped children and adults, volunteering in the Peace Corps around the world, and contributing greatly to the cause of humanity through their professional skills.

In terms of financial rewards women graduates receive the third highest starting salaries for women in the country. Professional preparation is also preparation for individual home and family living.

Undergraduate Study

Students may work toward the bachelor's degree in any of the five departments of the college. Programs interrelate the work of all departments and of others throughout the University. Curricula are designed to provide for professional competency. They are based on departmental major and minor requirements together with the University general education requirements. Creative work experience is matched with formal study.

Each of the departments is well equipped and has up-to-date facilities for teaching and research.

Generally, the first two years of study are devoted to obtaining a liberal education and completing prerequisite courses. Thus, the student has time to study possibilities in all areas before choosing the one best suited to his individual needs and interests. The bachelor's degree is earned by fulfilling the requirements in the chosen curriculum.

Sufficient flexibility is provided to:

1) **Capitalize on individual interests and abilities.** For example, the science-minded student may choose a Family Life Major in which chemistry and physics play a dominant role. For those interested in commercial art, the study of design may pave the way to a career in fashion illustration, design of kitchen equipment, or any of the numerous related careers in the Art-Family Life field. Similarly, a minor in Journalism can lead to such jobs as the writing or supervision of advertising copy for home and family products; or the presentation of consumer goods via the media of newspapers, magazines, radio, or television. Education courses in Home Economics are requisite for the student who plans to become an extension agent, utility home economist, or a home economics teacher.

2) **Satisfy individual requirements.** For example, some students arrange for double majors to prepare for teaching and extension work, teaching in nursery school and the elementary grades, or for clothing retailing and teaching. Others choose Family Life courses for their personal use even though their major is in another field.

Men and women in all colleges and departments of the University may take courses in the College of Family Life provided they have the prerequisite courses where these are required. Students may select courses most appropriate to their personal needs and interests.

Honors. An Honors program is provided for those students with a potential for unusual scholastic achievement. To be eligible, stu-

dents must meet the requirements given on page 35 of the catalog.

Each student has a qualified adviser to help with decision making.

Graduate Study

All departments offer work for the master's degree, and the Food and Nutrition Department offers the doctor's degree. The Institute for Research on Man and His Personal Environment, established in 1967, provides opportunities for the study of man as a totality with respect to his physical, social, and psychological responses to his environment, with emphasis on clothing, textiles, home furnishings, and housing.

Family Life Courses

Undergraduate

397 (197). Honors Studies. Advanced work for students approved by the College of Family Life Honors Committee. Special projects initiated by the student may be conducted under the direction of a faculty member or advanced study may be pursued in connection with an established departmental course. (F, W, Sp) **Staff**

Graduate

680 (293). Research Methods. Design and style for thesis and research reports; application of measurements and statistical techniques to professional problems in Family Life. A research report presenting and analyzing findings of a study in the student's major field is required. (3F) **Schvaneveldt**

General Major in Family Life

Coordinator Dean Phyllis Snow

Adviser Any staff member in any department in Family Life

This program is designed for the student wishing general education for family living plus a broad cultural education. Also the curriculum is suited to positions for which a general background is required, such as journalism, international service, or participation in government agency programs such as Vista, Peace Corps, and Public Welfare.

Fifty credits, taken in at least three departments, are required for the major. The minor should be selected to complement the major.

As soon as possible after choosing this major the student should plan with the adviser.

Combination Major in

Family Life and Business Administration

This is a program for those who desire basic education for family living plus sufficient secretarial training to provide for employment opportunities in business. For the bachelor's degree, students complete majors in both Family Life and Office Administration plus the University General Education requirements as listed in the catalog.

FAMILY LIFE COURSES

Students are required to complete a minimum of 45 credits

within the College of Family Life with not less than nine credits from each of the following departments: Clothing and Textiles, Family and Child Development, Food and Nutrition, Household Economics and Management. Specific courses in each of the departments will be determined in consultation with student's adviser.

Office Administration Courses

Courses			Credits
BE	112	Intermediate Typewriting	2
BE	113	Advanced Typewriting	2
BE	124	Dictation and Transcription	5
BE	131	Business Machines	2
BE	201	Office Practice	2
BE	241	Office Data Systems	3
BE	351	Business Communications	3
BE	441	Secretarial Procedures	3
BE	541	Office Management	3
BA	201	Business Law	2
BA	202	Business Law	2
BA	511	Management Concepts	4
Acctg	305	Survey of Accounting Principles	4
Econ	200	General Economics	5
CS	150	Introduction to Computer Science	3
Total			45

College of

Humanities, Arts and Social Sciences

Dean M. Judd Harmon

Assistant to the Dean Richard C. Haycock

Assistant to the Dean and Coordinator of Fine Arts Marlan D. Nelson

Offices in Main 131

The College of Humanities, Arts and Social Sciences has the following departments, majors and degrees:

Art — Advertising Design, Art Education, Ceramics, Fabric Design, Interior Design, Jewelry and Metalsmithing, Painting, Drawing, Photography, Printmaking, Sculpture, Illustration; BA, BFA, MA, MFA

English and Journalism — English, English Teaching, American Studies, Journalism; BA, BS, MA

History — Geography, History; BS, BA, MS, MA

Landscape Architecture and Environmental Planning — Landscape Architecture and Environmental Planning; BLA, MLA, MSEP

Languages and Philosophy — German, French, Spanish: BA; Philosophy: BS, BA

Music—Music Education, Applied Music, Music Theory; BA, BM, MA, MM

Political Science — Political Science, Pre-Law; BS, BA, MS, MA

Sociology, Social Work and Anthropology — Sociology, Social Work; BS, BA, MS, MA, PhD

Speech — Speech, Speech-Theatre Arts (Composite); BS, BA, MS, MA

Theatre Arts — Theatre Teaching, Theatre Arts-Speech (Composite); BS, BA, MS, MA

Within the College of Humanities, Arts and Social Sciences are found those departments which provide career preparation in some of the most interesting and vital academic fields. The study of society, the governing of society and its history, communication in a number of languages, the various aspects of culture — all these appeal to an increasing number of undergraduate and graduate students. Many train for careers in these fields; more, scientists, engineers, etc., take courses to broaden their horizons and add interest to their lives.

It is probably fair to say that the social trend is toward an awareness that while material things are important they are not enough for a full life. For this, the individual may turn to literature, art, music, the theatre. His concern with environmental problems may lead him to an investigation of landscape architecture. The complexities of modern life necessitate an understanding of

the social sciences and history. It is within the College of Humanities, Arts and Social Sciences that these needs may be fulfilled.

Liberal Arts

Adviser Marlan D. Nelson
Office in Main 133-C

The Liberal Arts program provides a course of study combining elements of both the humanities and the sciences and leads to a degree in Liberal Arts. Considerable flexibility is afforded through choice among several curricula. The goal is substantial, orderly, well-balanced mental development of a broad type. Eventual selection of a field of concentration in the general area of either the sciences or the humanities is required for a degree.

CURRICULA IN LIBERAL ARTS

The following three courses of study, each leading to a bachelor's degree, are available in Liberal Arts. Students are not required to complete a separate minor. Because of the requirements for basic courses in several fields, upper division requirements for graduation may be reduced to a minimum of 50 credits.

I. **Main Currents in Western Civilization.** Two years of a foreign language; a concentration of 40 credits in either History or Literature and 15 credits in the one not chosen for concentration; 14 credits in Philosophy[1]; 15 credits in one of the sciences or in Mathematics.

A) Literature. 1) For concentration: English 216, 217, 531, 532, and 533; and 15 credits selected from English 525, 544, 548, 552, 565, 566, and classes in the literature of a foreign country. 2) For the 15-credit requirement for those concentrating in History: any 15 credits from the above courses.

B) History. 1) For concentration: History 104, 105; and 30 credits in History, chiefly upper division, chosen in consultation with a member of the History faculty. 2) For the 15-credit requirement for those concentrating in literature: History 104, 105, 170.

C) Philosophy. Fourteen credits from the following: Philosophy 101, 111, 112, 325, 350, 370, 411, 522; Political Science 534, 535, 536.

D) Mathematics and Science. Complete one of the following series: 1) Biological Science: Biology 120 or Bacteriology 111 and 112; Zoology 251 and 553; Public Health 455. 2) Chemistry: Chemistry 121, 122, 123, or 111, 112, 141. 3) Mathematics: Mathematics 105, 106, 220. 4) Physics: Physics 111, 112, 113, or 221, 222, 223. If students select the series in Physics, they should fill the exact science group requirements with Mathematics 105 and 106, and are advised to complete Mathematics 220 also.

II. **Languages and World Literature.** Thirty-nine credits in foreign languages; 40 credits in Literature; 30 credits in Philosophy.

A) Languages. Two years in one foreign language; one year in a second foreign language.

B) Literature (40 credits). 1) At least 25 credits selected from English 216, 217, 441, 442, 525, 531, 532, 533. 2) At least nine credits in the literature of one or more foreign languages.

C) Philosophy. Philosophy 101, 111, 112, 210, 215, or upper divi-

[1]See Philosophy Division of Department of Languages and Philosophy. Political Science 534, 535, and 536 deal with political philosophy and are therefore relevant.

sion work; History 104, and 105; any two (six credits) of Political Science 534, 535, 536.

III. **Science and Philosophy.** Two years of a foreign language; a concentration in either mathematics and physical science or in biological sciences as specified below; 30 credits in History, Philosophy, and Literature.

A) Science. Complete one of the following programs: 1) Physical Science and Mathematics[1]; Mathematics 105, 106, 220, 221, 222, 223, and either (a) or (b): a) Chemistry 121-122-123 or 111-112,-141; Physics 211-212-213 or 221-222-223; 341-342-343 or 461-462-463. b) Physics 111-112-113 or 221-222-223; Chemistry 121-122-123 or 111-112-141; 306-307-308 or 331-332-333. 2) Biological Sciences[1]: Biology 120, Zoology 160, 553, 571; Botany 110, 420, 532; Bacteriology 111, 112, 502; Public Health 455; Physiology 301. Students selecting this series should fill the physical science group requirements with classes in Chemistry or Physics.

B) History, Literature, Philosophy. Thirty credits from among the following, shared among at least three departments: English, American or Comparative Literature or the literature of a foreign language; Philosophy 101, 111, 112, 210, 215, 325, 350, 370, 411, 522; History; Political Science 534, 535, 536; Sociology 101; Economics 200, 201.

[1]Ten of these credits may be applied toward the group requirements in the field.

Liberal Studies

Coordinator Richard C. Haycock

Office in Main 131

The chief function of the Liberal Studies program is the advisement of students who have not decided upon a major subject or area of specialization. The Liberal Studies coordinator finds a suitable adviser for each of these students. With the aid of this adviser he looks after the student's academic interests, encouraging him to pursue a general Liberal Studies program while he explores his own aptitudes and various career opportunities so that he can choose a major field.

Students who are enrolled in another department but believe they have chosen their major unwisely may transfer to the Liberal Studies program upon receiving permission from the dean of the College of Humanities, Arts and Social Sciences.

College of

Natural Resources

Dean Thadis W. Box

Associate Dean Frederic N. Wagner

Office in Forestry-Zoology 106

The College of Natural Resources has the following departments, majors, and degrees:

Forest Science — Forest Management, Forest Recreation, Forest-Watershed Management, Forest Biology; BS, MS, MF, PhD

Range Science — General Range Science, Forest Range Science, Range Watershed Management, Range Economics and Appraisal; BS, MS, PhD

Wildlife Resources — Wildlife Resources, Fishery Biology, Wildlife Biology, Fishery Management, Wildlife Management, Limnology, Animal Ecology, Animal Behavior; BS, MS, PhD

Increasing activity in the fields of Forest, Range, Wildlife, Soil Conservation, Watershed Management, and Forest Recreation, and the unquestioned need for their correlation in long-range wildland management, have created excellent opportunities for men who wish to work in these fields. The purpose of this college is to provide training in the use and management of natural resources. Natural resources covers a broad field. In popular usage it connotes renewable land and water resources and their management for food, fiber, and recreation in a relatively natural setting. The forests, range lands, wildlife resources, watersheds, and forest recreation resources comprise the natural resources in which the college has developed special professional competence. Used in this context, natural resources does not refer to minerals and cultivated land.

The favorable geographical location of this college provides exceptional facilities for field experience and affords excellent opportunities for effective training in managing wildlands and their resources. Forest and range lands in Utah comprise more than 90 percent of the total state area. The Cache National Forest within two miles of the school, the Bear River Migratory Bird Refuge within 40 miles, and vast areas of lands provide forest, range, soil conservation and wildlife problems and offer unlimited study projects and opportunities for demonstration. Herds of elk and deer are studied close to the campus during the winter. Primitive areas, Yellowstone Park, and other national parks are within one day's driving distance.

Career Opportunities. The curricula of this college prepare a student for positions with federal or state agencies and for private work in 1) Forest Science, 2) Range Science, and 3) Wildlife Resources. A Forest Science student may choose from four majors: one designed to train for general Forest Management work as typified by the demand of public land management agencies, one in Forest Recreation, one in

Forest-Watershed Management, and one in Forest Business.

A Range Science student may specialize in General Range Management, Forest-Range Management, Range Economics and Management Appraisal, or Watershed Management. A Wildlife Resources student may select a curriculum to train either for Game Management or Fishery Management.

A student will make more satisfactory progress if he has had two years of high school algebra, geometry, and also chemistry, physics, typing, and biology. Four years of English are also desirable. An interest in and an aptitude for studying natural science is important. Mere field ability is not sufficient. A prospective student should realize that Forestry and related fields are highly technical professions. They require high aptitude for scholarship and technical development. Success also is correlated with personality and ability to deal with people.

Application forms may be obtained from the Admissions Office. Transfer students should send their college transcript, together with their application for admission, to the Office of Admissions and Records.

Summer Camp. Successful completion of field instruction at the college-operated Summer Camp is required of students who plan to major in any curriculum in the Forest Science Department or the Forest-Range Management option offered by the Range Science Department. Any properly qualified student in the college may attend if he desires and if he makes suitable arrangements prior to the camp period. The camp opens soon (usually the first Monday) after the end of Spring Quarter, and continues for seven weeks, unless the camp is released for fire-fighting, in which instance the camp lasts eight weeks. Nine credits are allowed for the complete program. In addition to the regular Summer Quarter fees, a $5 fee is charged for each of the four courses. Board is provided on a cost basis; lodging is without cost.

As a transfer to this college from another school a student should note that: 1) Completion of the camp program is required in the above-named courses of study. 2) It is a prerequisite to professional Forest Science course work in the Junior year. 3) In addition to having completed two years of college work, the pattern of courses taken at another college should essentially duplicate that required of Freshmen and Sophomores in this college.

Field trips are planned each year as part of the regular class instruction. Besides short trips scheduled for individual courses, departments conduct an extensive field-problems trip in the Spring Quarter of the Junior year, or the Fall Quarter of the Senior year. The trip for Range Science Seniors is taken just before Fall Quarter starts. The trip for Forest Science Juniors is taken during a period of ten days or two weeks just prior to the end of the Spring Quarter. A fee of about $50 is charged each student to defray the transportation expenses of the trip.

Loan Funds. Four sources of funds are available on a loan basis to worthy, deserving upper division students in the College of Natural Resources. These are the W. B. Rice Memorial Loan Fund, the Turner Memorial Fund, the Arthur Pirsko Loan Fund, and the Bureau of Land Management

Fund. Loans are made for short periods. Application should be made through the dean's office.

Scholarships and Assistantships. A number of scholarships and assistantships are available to students in the college. Interested high school seniors and transfer students are encouraged to write to the dean regarding these. See also "Awards, Honors, Scholarships and Grants-in-Aid."

Graduation Requirements. The following general requirements must be met for graduation from the College of Natural Resources: 1) 192 credits, exclusive of Basic Military Science, Physical Education, and Forestry Summer Camp; 2) all courses prescribed under the study program of one's chosen field; 3) fulfillment of the General Education requirement of the University; 4) proficiency in written and spoken English; if deficient in English, a student is required to pass certain supplementary or corrective courses in addition to regular requirements; 5) Seniors in the college must have a grade average in their professional courses of 2.2. A deficiency in grade point may be remedied by taking additional professional courses or by repeating professional courses for which a low grade was received.

College of

Science

Dean Ralph M. Johnson

Acting Assistant Dean Donald V. Sisson

Office in Forestry-Zoology 101

The College of Science has the following departments, majors and degrees:

Applied Statistics-Computer Science — Applied Statistics, Computer Science; BS, MS

Bacteriology, Public Health—Bacteriology, Public Health, Medical Technology; BS, MS, PhD

Botany — Plant Pathology, Plant Physiology, Plant Ecology, Taxonomy, Virology, Cytogenetics; BS, MS, PhD

Chemistry — Chemistry, Biochemistry; BA, BS, MS, PhD

Geology — Geology; BA, BS, MS

Mathematics—Mathematics, Mathematics Teaching; BS, MS, MM

Physics — Physics; BS, MS, PhD

Zoology — Zoology, Entomology, Physiology, Pre-Dental and Pre-Medical combined curriculum, Nursing Program; BS, MS, PhD

USU has always given a high place to the sciences. Our 20th century civilization is based on science, and every facet of this great area is fundamental in a land-grant university such as ours.

Opportunities for rewarding careers are excellent in all science fields. Opportunities exist in

education, research, conservation, service, sales, hospitals, industry and engineering concerns, just to name a few.

The curricula of the science departments are designed to achieve four purposes:

First, they serve all students, because no college graduate today can be considered educated without an appreciation of scientific principles. The sciences are truly liberal. They contribute to the general education as surely and as importantly as the humanities and arts and the social sciences.

The second purpose of the college is to train teachers of science. This is an increasingly significant responsibility. America cannot move forward unless it has competent, well-trained teachers of science on every level of education.

Third, the health professions are properly grounded on science. The University has an excellent record in providing pre-dental and pre-medical training. Students in these programs move directly into the professional dental and medical schools of other universities. The basic training of these people will continue to be an important part of the program in the College of Science.

Finally, the College of Science trains research scholars in the various areas of science. To become a competent chemist, physicist, geologist, or scientist in any other area, the student must have a sound undergraduate major in the subject, followed by years of graduate specialization in his field. The production of able research scientists is of prime importance and is a major function of the departments in the college.

Opportunities for competent and conscientious students in the various science fields is unlimited. Demands for teachers and researchers are far greater than the supply. Monetary rewards are substantial, and the spiritual and intellectual rewards satisfying. Science is challenging. It demands the best from students, but for those who succeed it offers a rich return.

Students planning to enter the sciences are urged to discuss their plans and goals early with their advisers, department heads, and dean. Basic course work in mathematics, chemistry, and physics is essential to most areas of science. Several scholarships are available to science students. Teaching and research assistantships are available through the science departments. General requirements for graduation are the same as those outlined for the entire University.

Science Majors

A lower division student who wishes to major in Science, but who has not selected a specific major, may register in the college as a Science major. During the Freshman year, he will take a course of study that will prepare him for further study in any of the departments within the college.

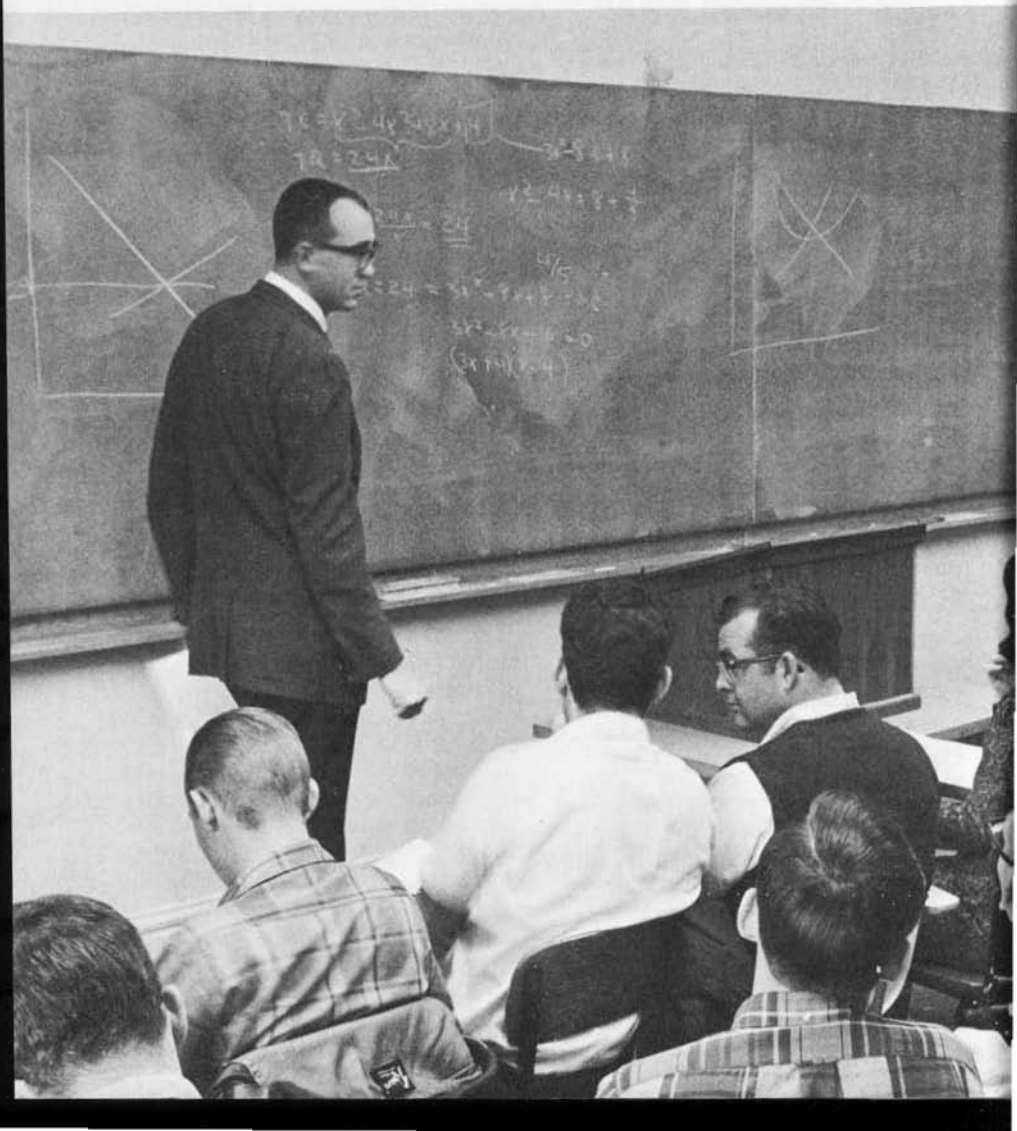
At the end of the first year of study, he may enter one of the departments or he may continue for one more year as a Science major. His course of study for the second year will be designed to permit as much flexibility for future years as is consistent with his objectives. The student should select his major subject by the end of his fifth quarter of study.

The Freshman course of study for a Science major is as follows:

Courses	Credits F	W	Sp
Chemistry 121, 122, 123	5	5	5
Math 105, 106, 220[1]	5	5	5
Freshman English 101, 102, 103	3	3	3
Electives	3or4	3or4	3or4
Totals	16or17	16or17	16or17

[1]The exact math sequence will be determined for each student using his previous experience in mathematics and his scores on the math placement tests as guides. Students with adequate preparation in algebra and/or trigonometry may be excused from Math 105 and/or 106. Such students would then be able to proceed further with the introductory calculus sequence (Math 220, 221, 222, 223) during the Freshman year.

The course of study for the second year will depend on the student's specific aptitudes and interests. It will be arranged with the assistance of one or more advisers who are familiar with the preparation required for further study in each of the majors the student may wish to consider.



DEPARTMENTS OF INSTRUCTION

Departments of Instruction

Department	Head	Office Building
Accounting	Norman S. Cannon	Business 509
Aerospace Studies	Ralph F. Jackson	Military Science 107
Agricultural Education	Gilbert A. Long	Ag Science 252
Agricultural and Irrigation Engineering	A. Alvin Bishop	Engineering C-213
Animal Science	James A. Bennett	Ag Science 232
Applied Statistics and Computer Science	Rex L. Hurst	Computer Science 132
Art	Harrison T. Groutage	Mechanic Arts 110
Bacteriology, Public Health	Rex S. Spendlove	
Botany	Orson S. Cannon	Plant Industry 309
Business Administration	Eugene C. Kartchner (acting)	Plant Industry 204
Business Education and Office Administration	Theodore W. Ivarie	Business 811
Chemistry	Garth L. Lee	Maeser Laboratory 106
Civil Engineering	Elliot Rich	Engineering L-162
Clothing and Textiles	Phyllis R. Snow (acting)	Family Life 303
Communicative Disorders	Jay R. Jensen	Mechanic Arts 202
Dairy Science	George E. Stoddard	Animal Industry 106
Economics	Reed R. Durtschi	Business 611
Educational Administration	Charles O. Ryan	Education 310E
Electrical Engineering	Bruce O. Watkins	Engineering L-148
Elementary Education	Edith Shaw	Education 206
English and Journalism	Reed C. Stock	Library 420
Family and Child Development	Don C. Carter	Family Life 215D
Food and Nutrition	Ethelwyn B. Wilcox	Family Life 111
Food Science and Industries	C. A. Ernstrom	Animal Industry 212
Forest Science	Lawrence S. Davis	Forestry-Zoology 155
Geology	Clyde T. Hardy	Main 258
Health, Physical Education and Recreation	Dale O. Nelson	HPER
History	William F. Lye	Main 317
Home Economics Education	Marie N. Krueger	Family Life 318
Household Economics and Management	Edith Nyman	Family Life 314B
Industrial and Technical Education	Neill C. Slack	Industrial Science 112
Instructional Media	Lester C. Essig	Library 216A
Landscape Architecture and Environmental Planning	Burton Taylor	Technical Services 201
Languages and Philosophy	L. Grant Reese	Main 210
Manufacturing Engineering	Carl D. Spear	Engineering L-134
Mathematics	Lawrence O. Cannon	Engineering C-325
Mechanical Engineering	Russell M. Holdredge	Engineering L-180
Military Science	Joseph A. Gappa, Jr.	Military Science 102
Music	Max F. Dalby	Fine Arts 107
Physics	W. Farrell Edwards	Engineering L-154
Plant Science	David R. Walker (acting)	Ag Science 322
Political Science	JeDon A. Emenhiser	Main 248
Psychology	Heber C. Sharp	Education 309
Range Science	Cyrus M. McKell	Forestry-Zoology 181
Secondary Education	Kenneth C. Farrer	Education 206
Sociology, Social Work and Anthropology	Therel R. Black	Main 220
Soils and Meteorology	R. L. Smith	Ag Science 148
Special Education	Marvin G. Fifield	Richards Hall 514G
Speech	Rex E. Robinson	Main 33
Theatre Arts	Floyd T. Morgan	Fine Arts 232
Veterinary Science	Merthyr L. Miner	Veterinary Science 101
Wildlife Resources	William F. Sigler	Forestry-Zoology 163
Zoology	Datus M. Hammond	Forestry-Zoology 119

*Department of

Accounting

Head: Professor Norman S. Cannon

Office in Business 509

Associate Professors Frank A. Condie, Joseph S. Merrill, William V. Tezak

Assistant Professors Duane Barker, Ronald L. Pierce, Boyd C. Randall

Degrees: Bachelor of Arts (BA), Bachelor of Science (BS), Master of Accounting

Major: Accounting

The basic objective of the first two years' program in the Department of Accounting is to provide a broad and sound educational foundation upon which to build a professional education in accounting.

Undergraduate Study

Lower Division. The proposed program for the first two years stresses general education in the Social Sciences, the Natural Sciences, and the Humanities. It fills the lower division group requirements as well as the state and institutional requirements for an understanding of the American system. The few courses in Business and Economics offered in the Sophomore year form the foundation for entry into the upper division professional program.

FRESHMAN YEAR

Courses	Credits
English 101, 102, 103	9
Natural Science (Math 105, Biology, Physiology, Physics, Chemistry, Geology, etc.)	18
Political Science 110	5
History, Sociology 101 or Psychology 101	10
PE, MS, or AS	3-6
Approved Electives	1-5

SOPHOMORE YEAR

Accounting 201, 202, 203	9
Office Administration 131	2
Economics 200, 201	10
Computer Science 150	3
Math 241, 242	8
Humanities	10-15
Approved Electives	5-11

*In College of Business.

Upper Division. During the last two years all Accounting majors must take the following core and supporting courses:

Business Administration

BA 301, 302 Commercial Law, Junior year
BA 506, 507 Business Statistics, Junior year
BA 550 Marketing, Junior year
BA 540 Corporation Finance
BA 489 Business Policy

Economics

Econ 501 Intermediate Economic Theory
Econ 500, or 532, or 560

Accounting

Acct 411, 412 Intermediate Accounting, Junior year
Acct 521, 522 Advanced Accounting
Acct 431 Cost Accounting, Junior year
Acct 541 Income Tax Accounting
Acct 551 Auditing
Acct 561 Accounting Theory

Computer Science

CS 350 Programming Business Problems

Professional Electives. Most students will find time for additional courses in related fields. Some of the more attractive courses are suggested below:

Business Administration

BA 570 Production Management
BA 560 Personnel Administration
BA 449 Problems in Finance
BA 446 Investments
BA 448 Security Analysis

Accounting

Acct 432 Advanced Cost Accounting

Acct 542 2nd quarter of Income Tax Accounting
Acct 471 Governmental Accounting
Acct 571, 572, 573 CPA Review
Acct 581 Accounting Systems and Automation

Computer Science
CS 450 File and Input-Output Management
CS 515 Systems Analysis
CS 430 Computer Structure
CS 475 Data Structures
CS 470 Operations Research

Selection of a Minor. A student majoring in Accounting may select a minor in any area as long as his program meets the University requirements and is approved by the minor department and his major adviser. In the past the normal minor for Accounting majors has been Economics, but Computer Science is increasingly popular.

Graduate Study

In this day of specialization, the value of a good broad educational base from which to start the specialization is obvious. Most of the professional Accounting Associations (AICPA, AAA, etc.) have gone on record as favoring a fifth year in which to provide time to fully develop breadth in general education as well as depth in professional specialization. The Accounting Department offers two approaches to these goals. The Master of Accounting degree is offered to students with an undergraduate specialization in Accounting in a three-quarter program.

For Non-Accountants. There is also a five-quarter program available for students with non-accounting undergraduate specialization that can be completed in fifteen months. Details of these programs are available in the Graduate Catalog or at the office of the head of the Accounting Department.

Accounting Courses

201, 202, 203. (1, 2, 3) Introductory Accounting. (3F, 3W, 3Sp, 3Su)
Barker, Pierce, Randall

305. (100) Survey of Accounting. (4F, W, Sp, Su) **Tezak**

411, 412. (101, 102) Intermediate Accounting. Prerequisites: Acct 201, 202, 203. 411. (4F, W). 412 (4W, Sp) **Barker, Pierce**

431. (111) Industrial Cost Accounting. (5W, Sp) **Cannon**

432. (112) Advanced Cost Accounting. (3Sp) **Cannon**

471. (129). Governmental Accounting. (3W) **Barker**

479. (199) Internship in Accounting. Experience with public accounting firms and approved business in the Intermountain and Pacific Coast regions. Credit arranged, not to exceed seven credits. (F, W, Sp, Su) **Cannon**

501, 502. (201, 202) Accounting for Management Control. An introduction to accounting at the graduate level. (3F, W, Su) **Condie, Pierce**

521, 522. (103, 104) Advanced Accounting. 521 (4F, Sp), 522 (4F, W) **Staff**

541, 542. (127, 128) Income Tax Accounting. 541 (4F, Sp), 542 (4W Su) **Cannon, Condie, Randall**

551. (121) Auditing. Prerequisites: Acct 411, 412, 431. (4W, Sp) **Condie, Simkins**

561. (140) Accounting Theory. Prerequisites: Acct 411, 412, 431. **Condie**

571. (206) CPA Law Review. (3F) **Thurmond**

572, 573. (207, 208) CPA Review. Stresses practice and theory. Sections of exam. (3W, Sp) **Barker**

581. (119) Accounting Systems and Automation. (3W) **Barker**

Graduate

611, 612. (203, 204) Intermediate Accounting Practice. Prerequisites: Acct 501, 502, or 201, 202, 203. (4F, W) **Cannon, Condie**

621. (205) Advanced Accounting Practice. (4Sp) **Condie**

631. (212) Cases in Cost Accounting. Prerequisite: Acct 431. (3F) **Cannon**

635. (241) Seminar in Controllership. Prerequisite: Intermediate Accounting. (3F) **Condie**

641. (227) Tax Planning and Research. Prerequisite: Acct 541. **Cannon, Randall**

631. (221) Seminar in Auditing. (3Sp) Condie
641. (297) Seminar in Theory. (3W) Condie
665. (298) Seminar in Problems. (3Sp) Cannon
699. (295) Independent Research and Reading. Staff
697. (290) Thesis. Credit arranged. (F, W, Sp, Su) Staff
699. (400) Continuing Graduate Advisement. (F, W, Sp, Su) Staff

**Department of*

Aerospace Studies

University ROTC Coordinator: Professor Edwin L. Peterson

Head: Professor Colonel Ralph F. Jackson

Office in Military Science 107

Assistant Professors Major Gordon E. Roselund, Captain Edmond F. Kiechlin, Captain William A. Smiley

The purpose of Air Force ROTC is to provide education that will develop skills and attitudes vital to the career of a professional Air Force Officer. It is not the purpose of the course to train in a specific field, but rather to give an understanding of the mission and the global responsibilities of the United States Air Force. The academic phase develops a background in national and international affairs to help interpret and evaluate world events.

The AFROTC teaching methodology is based on the seminar and independent study methods of the graduate school. Professional officer preparation is achieved by active participation of the cadet in a learning situation which parallels, in many respects, the activities of an Air Force Officer, through discussion, conference, and coordination actions leading to decision making. The curriculum has been designed to meet the following criteria: college-level content, scope, intensity and presentation; appeal for students in all academic fields; and training to prepare students for flying training upon graduation, if qualified. Women students are eligible to participate in all areas of the AFROTC program except flight training.

The Four-Year Program. Study is divided into the GMC, covering the first two years, and the Professional Officer Course (POC), covering the Junior and Senior years plus four weeks of summer training. The course consists of instruction totaling 360 credits, allocated as follows: Freshman and Sophomore — 60 each; Junior and Senior years — 120 credits each. Summer training of four weeks is normally scheduled between the second and third years.

Freshman courses explore the functions of military forces according to broad categories of strategic offensive, strategic defensive, general purpose, and aerospace support. Sophomore courses

*In College of Business.

examine defense organization and policies, alliances, and defense policy. These two courses constitute the General Military Course.

The Junior year deals with the development of air power, astronautics and space operations, and future developments in aerospace power. The Senior year course provides a study of leadership and management. The focus of the advanced course is on the mission environment and personal identification of the cadet with his career.

In addition, the curriculum includes: experiences designed to stimulate and develop a growing interest in the Air Force flight training program (e.g., orientation flights and visits to Air Force bases); opportunities to apply the principles of leadership, management and staff work in practical situations, and other related experiences.

The Two-Year Program. All requirements for commissioning can be completed in the two-year program. Students must apply prior to the February which precedes their final two years of college. Screening of candidates for the two-year program will conform to the same requirements for selecting advanced students in the four-year program. Prior to formal enrollment each student must successfully complete six weeks of field training. The course of instruction is the same required of the four-year program with the General Military Course program covered in the six weeks of field training. Women students are eligible for the program.

Air Force Scholarships. AFROTC college scholarship program grants are available on a competitive basis to members of the four-year program. These scholarships pay all tuition and fees, provide textbook allowances and $50 per month non-taxable cash. Eligible Freshmen, Sophomores and Juniors apply directly to the Professor of Aerospace Studies. Women students are eligible to apply.

Physical Requirements. All cadets must meet the physical standards for general military service. A cadet's physical examination for entry into the University will generally determine whether or not he meets these requirements.

Veterans. A veteran is accepted into the AFROTC program if he can complete the program prior to reaching age 30, provided he has completed at least two year's active duty and can meet the physical requirements. Parts of the General Military Course may be waived in lieu of prior military service. If accepted he can participate in the flight instruction program in the Senior year, provided he will be commissioned before age 26½ years.

Special University and AFROTC Requirements. Once a student enters the Professional Officer Course, successful completion of the course becomes a requirement for graduation, unless relieved of the requirements by the Professor of Aerospace Studies or the President of the University. In addition, when entering the Professional Officer Course, a student must agree to accept an Air Force commission if it is offered and to serve on active duty if directed to do so.

Upon initial enrollment at the University, Aerospace classes should be scheduled to be completed simultaneously with requirements for a degree.

To qualify as a pilot or navigator, cadets must be able to finish

the Aerospace program and graduate from the University before age 26½ years. Other cadets must complete the military program and graduate from the University prior to reaching the age of 28, unless they are veterans.

Regular Commissions in the United States Air Force. Outstanding AFROTC cadets who have demonstrated a high degree of leadership, initiative, and an interest in a career as a regular officer and are designated as Distinguished Military Graduates may be offered an opportunity to apply for a regular Air Force commission.

Payments to Advanced Cadets. The advanced cadet is paid $50 per month. Cadets will be paid approximately $195 for the Field Training Course plus travel pay for the round trip to and from camp.

Summer Training. a) Field Training (six weeks) is a prerequisite for cadets entering the AFROTC two-year program. Training will be given at an Air Force base and will last for six weeks.

b) Field Training (four weeks). All advanced cadets will attend one four-week summer training camp. Normally, attendance at this camp is between the Sophomore and Junior years at a selected Air Force base. Six university credits are granted for this training.

Flight Training. AFROTC is concerned with two types of flight training: the first type is taken while a student is a cadet at the University and the other after he has received a commission and has graduated.

Cadets designated potential pilots may register for the AFROTC Flight Instruction Program (FIP) during their Senior year. Successful completion of 36½ hours of flight instruction and an FAA examination should be adequate to qualify for a private pilot's license. The entire cost of this training is paid for by the Air Force.

Cadets designated to become pilots and navigators are required to take flight training after reporting for active duty.

Non-Flying Cadets. To meet the challenge of the aerospace age, its technological advances and its ever-broadening horizons, officers possessing a variety of skills are required within the Air Force. These skills cover the exact sciences and social sciences but are not limited to these study areas. After being called to active duty, cadets will serve four years. Interested cadets may contact the AFROTC Department for information on the Air Force specialist fields related to their academic major.

Delay of Entry on Active Duty. If cadets complete the AFROTC program and receive commissions, they may request a delay in call to active duty if they desire to continue studies toward a master's or doctor's degree. The length of the delay depends upon current AFROTC regulations and directives. Students who are slated for flight training, however, must enter such training before reaching 26½ years of age.

Texts and Uniforms. All AFROTC texts and uniforms are furnished at no expense to the student.

Air Force Library. A library of Air Force periodicals and publications is maintained for the Air Force ROTC cadet. Material rela-

tive to the AFROTC curriculum is also available.

Air Force ROTC Counseling Service. The AFROTC detachment maintains counseling services for each cadet. Service is offered primarily in areas concerned with the AFROTC curriculum.

Air Force Angel Flight. The Angel Flight is an AFROTC-sponsored organization of approximately 30 University women chosen by a composite board of judges. Former members of Angel Flights recognized by National Headquarters may transfer upon application. Applications for membership may be made by University women, except second- and third-quarter Seniors. The purpose of the Angel Flight is to provide the University with an AFROTC women's social auxiliary and to further the cause of the U.S. Air Force by promoting the interest of college students in the AFROTC program.

Angel Flight Courses

131, 132, 133. (61, 62, 63) Aerospace Studies Angel Flight, Freshmen. Emphasizes development of leadership characteristics for University women selected for membership. Includes classroom activities, social and service projects, and drill. (1F, 1W, 1Sp) **Kiechlin**

231, 232, 233. (64, 65, 66) Aerospace Studies Angel Flight, Sophomores. (1F, 1W, 1Sp) **Kiechlin**

331, 332, 333. (161, 162, 163) Aerospace Studies Angel Flights, Juniors. (1F, 1W, 1Sp) **Kiechlin**

431, 432, 433. (164, 165, 166) Aerospace Studies Angel Flight, Seniors. (1F, 1W, 1Sp) **Kiechlin**

Aerospace Studies. One hour of Corps Training is required each week during the Fall, Winter, and Spring Quarters for each year of Aerospace Studies. This is held at 11:30 on Thursdays.

Aerospace Studies AS 100
First Year
General Military Course

These courses are the academic portion of the General Military Course for the Freshman year. This is a survey course designed to acquaint the student with the functions of U.S. military forces with primary emphasis on the U.S. Air Force. One class hour per week.

101. (10) Background of the United States Air Force. Doctrine, mission, organization of the U.S. Air Force. (2F) **Roselund**

102. (11) Strategic and General Purpose Forces. Functions of strategic offensive forces, strategic defensive forces and general purpose forces. (2W) **Roselund**

103. (12) United States Air Force Support Forces. Functions of U.S. aerospace support forces. (2Sp) **Roselund**

Aerospace Studies AS 200
Second Year
General Military Course

These courses are a continuation of the General Military Course from the Freshman year of Air Force ROTC. One class hour per week.

201. (21) Defense Organization. Organization and functions of Department of Defense and role of the military in U.S. national policies. (2F) **Jackson**

202. (22) Defense Policies. Theories of general war; nature and context of limited war; Soviet and Chinese strategies and policies. (2W) **Jackson**

203. (23) Alliances and Making of Defense Policy. Role of alliances in U.S. defense policies; the elements and processes in the making of defense policy. (2Sp) **Jackson**

Aerospace Studies AS 300
First Year
Professional Officer Course

This three-quarter course develops an understanding of the growth and development of aerospace doctrine, technology, organization, and employment. Particular

emphasis is given to developing proper techniques of written and oral communication skills required of the Air Force junior officer. Courses run three class hours per week.

301. (131) Growth of Air Power. A historically oriented approach covering the development of modern aerospace power from the early flight experiments of the 18th century through 1960. (3F) **Kiechlin**

302. (132) Aerospace Age. A concentration on aerospace power in the decade of the 1960's, with emphasis on those strategy and policy concepts important to the present time. Study includes the future of manned aircraft and an analytical study of the nature of insurgency and the role of airpower in responding effectively to this form of warfare. (3W) **Kiechlin**

303. (133) Space Operations. Includes the history and importance of the national space effort; the spatial environment; orbits and trajectories; space vehicle systems; foreign space programs; future developments in space. (3Sp) **Kiechlin**

340. (150) Field Training (Four Weeks). Four-year program. Consists of four weeks of practical training at a selected Air Force base in the United States. Field Training is normally taken during the summer following the Sophomore year. Two Field Training sessions per summer are offered; each cadet selected for entry into the POC must attend one of the sessions. Included are lectures in electronic communications, navigation, supply, meteorology, air traffic control, first aid, and sanitation. Pressure and altitude chamber experience complete with orientation lectures, permits the cadet to ride in jet aircraft. Cadets participate in preflight and postflight briefings and receive emergency equipment indoctrination. Practical leadership training is provided through group calisthenics, individual and group sports, familiarization firing of pistol and carbine, and directing cadet operations. For pay and travel reimbursement see "Payments to Advanced Cadets." (6Su) **Staff**

360. (160) Field Training (Six Weeks). Two-year program. Consists of six weeks of practical and academic training at a selected Air Force base in the United States. Practical training is essentially the same as explained above in Field Training 340. In addition, two weeks of classroom activity covers much of the curriculum taught in AS 100 and AS 200. For pay and travel reimbursement see "Payments to Advanced Cadets." (6Su) **Staff**

Aerospace Studies AS 400
Second Year
Professional Officer Course

Includes leadership and management theory and applications, problem solving, human relations, military justice system, and development of communicative skills.

401. (141) Leadership Theory. Includes the study and application of concepts of human behavior and human relations to organizational situations. Discusses the need and means for maintaining individual and organizational discipline. Reviews the military justice system. Includes a variety of teaching methods such as lectures, group discussion, case studies, and written and oral reports by students. (3F) **Smiley**

402. (142) Management Theory. Includes the study of theoretical and practical management as applied in the Air Force. Introduces information systems, quantitative approaches to decision making and resource control techniques. Includes problem solving exercises, field trips, oral and written reports. (3W) **Smiley**

403. (143) Defense Management. A study of the execution phase of management in the Air Force. Primary emphasis on management methods used in the Air Force for management and control of personnel, materiel, and monetary resources. Concludes with an orientation toward active duty with the Air Force. (3Sp) **Smiley**

411. (145) Flight Instruction Program. Covers instruction in ground school which includes Civil Air regulations, weather and navigation, radio and airways procedures, and general service and operation of aircraft. Also includes 36½ hours of flying in light aircraft including preflight checks, solos, cross country flights and FAA flight examinations. Instruction arranged not to interfere with regular academic schedule. Ground school taught on campus. (3F) **Jackson**

*Department of

Agricultural Education

Head: Assistant Professor Gilbert A. Long
Office in Agricultural Science 252
Professor Emeritus Stanley S. Richardson
Associate Professor Von H. Jarrett
Instructor and Shop Foreman Keith W. Hatch
Lecturer Darwin S. Jolley
Degrees: Bachelor of Science (BS), Master of Science (MS), Two-year Program Certificate of Completion
Majors: Agricultural Education, Agricultural Machinery Mechanization

The programs offered in Agricultural Education are for students who are preparing for positions in: teaching vocational agriculture, agricultural mechanization and other agricultural careers. The curriculum is designed to prepare individuals for agricultural work in industries, commercial agriculture, and public relations.

The facilities for this program include laboratories with specially designed equipment for practical instruction in agricultural mechanization, which includes diesel engines, electricity, farmstead mechanization, mechanical skills, hydraulics, machinery and metallurgy.

Undergraduate Study

Preparation in Agricultural Education includes technical agriculture as well as principles and techniques of teaching.

Students interested in teaching Natural Resources, Agricultural Production, Agricultural Business, Agricultural Mechanics or other phases of agriculture will be guided into areas of their major interest. Agricultural backgrounds or agricultural experiences are desirable, but not mandatory.

An "application for admission to teacher education" should ordinarily be completed before the Junior year (see College of Education for requirements). Approval for admission to teacher education is a prerequisite to teacher certification candidacy and to enrollment in Education and Psychology courses.

Mechanized Agriculture

Two-year agricultural mechanization or industrial programs are developed to meet the needs of persons interested in employment opportunities with agricultural machinery companies, farm suppliers, feed and fertilizer agencies, or other non-farm marketing occupations. The student will get both the practical and the technical background for agricultural business. There is a summer placement program between the first and second year wherein the student is employed by an agricultural implement dealership.

The Department of Agricultural Education and the Department of Plant Science plan to sponsor a

*In College of Agriculture.

two-year technical program in ornamental horticulture.

FRESHMAN YEAR

Courses	Credits
English 101, 102, 103	9
Math 130, 101, 105, 106 **or** Physics 120	8-10
Biological Sciences (Biology 120, 121, 122)	5
Animal Production	6-8
Plant Science	4-5
MS, AS or PE	9

SOPHOMORE YEAR

Chemistry 111, 112, 141	15
Ag Economics 201, 202, 220, (may be taken first year in lieu of Animal or Plant Science)	9
Animal Production	3
Plant or Soil Science	3-4
Humanities (Psychology 101, Landscape Architecture 103)	8
Ag Education 101	5
Social Sciences (History 170, Political Science 110)	10
MS, AS or PE	3

JUNIOR YEAR

Ag Education 301, 302, 303	15
Bacteriology 111 and 112 or 301	5
Psychology 110, 366	6
Sec Education 301	5
Animal Science	6-8
Plant or Soils Science	6-8
Ag Economics	3

SENIOR YEAR

Humanities, (Literature, Speech, Music or Art) Soils and Meteorology 117	
Plant Science 301	3-5
Social Sciences - Economics 200	5
Ag Education 324, 325, 450, 460	18
Public Health 455	3
Plants or Soils Science	3-7
Animal or Dairy Science	1-5
Production of AV MTLS	3
Agricultural or Education electives	3

Total credits (196) as follows: Institutional and General 77: Education 32; MS, AS or PE 3.

Agricultural Mechanization Option:

FRESHMAN YEAR

Courses	Credits
English 101, 102, 103	9
Ag Education 64, 65, 66, 101, 163, 181, 182	33
Industrial and Technical Education 101	3

SOPHOMORE YEAR

Ag Education 83, 183, 185, 193, 196, 303	22
Business Administration 201, 202, 203, 135, 151	10
Industrial and Technical Education 446	3
Electives	13

(Two-year certificate is earned upon completion of requirements. For the four-year degree, the additional courses listed below must be taken.)

JUNIOR YEAR

Chemistry 111, 112, 141	15
Math 130, 101, 106	5
Biology 101	5
History 170	5
Plant Science 301	3
Electives	12

SENIOR YEAR

Physics 120 or 101	5
Zoology	5
Political Science 440, 210	6
Speech 510	5
Landscape Architecture 103	3
Electives	22

Graduate Study

The department offers the Master of Science degree with emphasis on specialization for post-secondary education. The research project and program of study may be coordinated within the areas of Agricultural Mechanics, Animal Production, Agricultural Business, Natural Resources or Education Administration. Students desiring information on graduate work should secure a Graduate Catalog and make application for admission to the Graduate School.

Agricultural Education Courses

Undergraduate

57. (105) Special Problems in Agricultural Mechanization. Basic skill preparation for employment in agricultural industry. (2-5 Su) **Hatch**

64. (13) Specialized Forage Equipment. Application of fundamental principles in purchasing, repairing, and maintaining forage equipment. (5W) **Staff**

65. (23) Agricultural Machinery Power Lifts. Principles utilized in the position, load, and draft control systems as related to power systems. (5Sp) **Staff**

66. (23) Agricultural Planting and Tillage Equipment. Application of fundamental principles in the operation, adjustment, maintenance, and repair of agricultural planting and tillage equipment. (5Sp) **Staff**

83. (42) Fundamentals of Lawn and Garden Equipment. Principles involved in the adjustment, operation, and maintenance of lawn and garden equipment. (4W) **Staff**

101. (1) Agricultural Mechanics. Selection, care and use of tools and equipment used in technical metals with the application of mechanical drawings related to agricultural mechanics. Three lectures, two labs. (5F, W) **Jarrett**

163. (12) Agricultural Power Trains. The fundamental principles in the transmittal of power from the tractor power unit to the implement. (5W) **Jolley**

181. (32) Agricultural Equipment Testing and Diagnosing I. Techniques in diagnosing malfunctions and the effect that a malfunction of one system may have on an interrelated component. (5F) **Hatch**

182. (33) Agricultural Equipment Shop. Procedures. Procedures and techniques utilized in developing, maintaining, and managing agricultural implement repair shops. (3F) **Hatch**

183. (43) Retailing of Agricultural Equipment Parts. The operation of an agricultural machinery parts department. (3W) **Staff**

185. (52) Agricultural Equipment Testing and Diagnosing II. Testing and diagnosis of both gas and diesel tractor engines. Simple and complex testing devices are used in diagnosing problems. (5Sp) **Staff**

193. (153) Occupational Experience in Agriculture. Supervised occupational experience for technical vocational preparation. (1-5F, W, Sp, Su) **Jarrett**

196. (53) Agricultural Equipment Technology Seminar. Advanced readings, discussion, and planned panel reports concerning job opportunities and practices in the agricultural equipment field. Problems typically encountered by those working in this field. (2Sp) **Staff**

301. (101) Agricultural Construction. Planning, estimating, layout, construction materials, painting, wiring, plumbing, concrete and masonry. Three lectures, two labs. (5Sp)

302. (102) Tractor Power. Design, operation, adjustment, maintenance, capacity and care of tractors and internal combustion engines. Three lectures, two labs. (5W, Sp) **Jarrett**

303. (103) Agricultural Machinery. Selection, operation, adjustment, maintenance, repair, and management of farm machinery. Includes materials of construction, also brazing and hard facing. Three lectures, two labs. (5F) **Jarrett**

304. (104) Senior Project. Involves scaled drawing, cost estimating, construction and formal report on student-selected project. (3Sp) **Jarrett**

312. (112) Principles of Vocational Education. Fundamentals in general and vocational education. Social and economic basis for vocational education. (2Sp) **Long**

324. (124) Methods of Teaching Agricultural Mechanics. Scope of mechanics in agriculture, lesson planning, course of study preparation, shop equipment and management, skill requirements, and supervised practice. (3F, W, Sp) **Jarrett**

325. (125) Methods of Teaching Agriculture. Principles and practices for cooperative occupational experience, curriculum development and teaching methods, testing, and evaluating as they relate to education in agriculture. (5F, W, Sp) **Long**

351. (151) Extension Methods. History, objectives, organization, and methods used in extension work in the United States. (3Sp) **Staff**

450. (281) Secondary Curriculum Seminar. Studies and reports on research and new developments. One quarter required for all majors in Agricultural Education. (3F, W, Sp) **Staff**

460. (126) Student Teaching in Secondary Schools. Students will leave the campus for six to eleven weeks. (12F, W, Sp) **Long**

Graduate

625. (225) Special Problems in Agricultural Education. A consideration of needs and special types of service in FFA, young farmers, and adult programs. (2-5F, Sp) **Staff**

680. (280) Research and Thesis. Credit Arranged. (F, W, Sp, Su) **Staff**

690. (290) Special Problems. For teachers of vocational agriculture who desire to develop a more practical program for young, adult, and other post-high school programs. (3Su) **Staff**

691. (291) Special Problems for Vocational Teachers. For teachers who participate in Annual Summer Conference Workshops. (2-5Su) **Staff**

699. (400) Continuing Graduate Advisement. **Staff**

*Department of

Agricultural and Irrigation Engineering

Head: Professor A. Alvin Bishop

Office in Engineering C213

Professors Bruce H. Anderson, Jay M. Bagley, Paul Christiansen, Calvin G. Clyde, Irving S. Dunn, Joel E. Fletcher, Cleve H. Milligan, Dean F. Peterson, Howard B. Peterson

Professor Emeritus Jerald E. Christiansen

Associate Professors Spencer H. Daines, Richard E. Griffin, David Hendricks, C. Earl Israelsen, Jack Keller, Fred W. Kiefer, Larry G. King, Joe E. Middlebrooks, Edwin C. Olsen III, Byron C. Palmer, Wayne Ringer, J. Paul Riley, Glen Stringham.

Assistant Professors Jose Alfaro, Roland Jeppson, Komain Unhanand, Wayne Willis

Lecturers Kenneth Bach, Donald R. Jeffs, William I. Palmer

Collaborator Allen Dedrick

Research Engineers Lloyd Austin, Richard Conn, George Hargreaves, Frank Haws, Michael J. Mickelson, Fred Shewman, Kern Stutler

Degrees: Bachelor of Science (BS), Master of Science (MS), Doctor of Philosophy (PhD)

Majors: Agricultural Engineering, Irrigation Engineering, Irrigation Science

USU has achieved world-wide recognition in Irrigation Engineering. Probably no other engineering college has contributed as much to the art and science of irrigation. The soil and water branch of Agricultural Engineering is emphasized at USU. Students from all over the world seek admission to this program. USU faculty members in the field are in great demand as consultants and have served in virtually every irrigated country.

A Water Research Laboratory, completed in 1965 at a cost of about $1,500,000, provides one of the finest facilities of its type in the world.

Agricultural Engineering applies the art and science of engineering principles to the solution of agricultural problems. Basic knowledge from almost all fields of Engineering is utilized. The Agricultural Engineering curriculum at USU emphasizes irrigation and drainage engineering, irrigation project planning and water resources planning, and draws freely from hydrology and hydraulic engineering.

Because of the strong emphasis on irrigation, drainage, and water resources, the Agricultural and Irrigation Engineering program is

*In College of Engineering.

closely integrated with Civil Engineering. Many faculty members serve on the staffs of both departments, and graduate programs are jointly planned to utilize the full resources of the two departments. (See Civil Engineering for programs in Hydraulic Engineering, Hydrology and Water Resources Engineering and Water Quality Engineering.)

Academic work is supplemented by field trips, which are required as a part of the course work. These field trips provide, under faculty guidance, first-hand study of Engineering projects in different stages of completion.

The four-year program listed here leads to the Bachelor of Science degree in Agricultural Engineering (Irrigation and Drainage). A five-year program is available for students with inadequate background to complete it in four years, or for those desiring to take Military Science, competitive athletics, or part-time employment. The curriculum is accredited by the Engineers' Council for Professional Development (ECPD).

This department cooperates with the Department of Soils and Meteorology to offer a BS degree program with a major in Irrigation and Soils. The course program includes some of the applied Irrigation Engineering courses, as well as basic courses in Mathematics, Science, and Soils. A complete outline of the program in Irrigation and Soils can be found within the Soils and Meteorology Department write-up.

Lower Division

Freshman and Sophomore Years
Common to All Engineers
(See College of Engineering Introduction)

Upper Division

JUNIOR YEAR

Courses	Credits F	W	Sp
Ag Engrg 343, 547, 545	3	3	4
Civil Engrg 304, 306, 224	5	4	3
Civil Engrg 350, 351, 328	3	3	3
Mech Engrg 330, Elec Engrg 405	3	3	
Humanities	3	3	3
[1]Technical Electives			3
Totals	17	16	16

SENIOR YEAR

Ag Engrg 549, 498, 548	3	3	3
Civil Engrg 406, Ag Engrg 546	4		4
Civil Engrg 442, 443, 420	4	4	3
[1]Technical Electives	3	3	
Civil Engrg 430, 321	3	3	
Humanities	3	3	5
Totals	17	16	15

[1]Technical electives may be selected from the following: Agricultural Engineering 308, 546 or 560, Soils 358, 505, 470, 555, 565, Civil Engineering 407, 508, 531, 532, 444, 561, or approved Mathematics or Applied Statistics.

Graduate Study. The MS and PhD degrees are offered in Agricultural Engineering and Irrigation Engineering (Irrigation and Drainage and Water Resources fields), and in collaboration with related departments the MS and PhD degrees are offered in Irrigation Science.

Admission to graduate study is obtained through filing an application and receiving formal acceptance by the School of Graduate Studies. The Graduate Record Examination (GRE) is required of all applicants. In addition to the GRE, the department may require a diagnostic examination of entering graduate students.

Curricula and research leading to an advanced degree either on the master's degree or doctor's degree level are supervised by a graduate committee appointed by the dean of the School of Graduate Studies. Staff members of the major department and of closely related departments serve on

these committees. All study and research programs must be approved by such a committee before admittance to candidacy for an advanced degree. The study and research program for a particular degree must also satisfy all of the requirements listed in the catalog for the School of Graduate Studies.

A graduate major leading to the MS and PhD degrees is available in Hydrology or Water Resources. For more information concerning these majors, see the material found in the section of this catalog for the Department of Civil Engineering.

Assistantships and Traineeships. The department is heavily involved in educational and research activities of national and international scope having to do with water management. These programs offer the graduate student the opportunity to participate in the research work being carried out in foreign countries and on the Logan campus. Financial support in the form of traineeships, assistantships, and part-time work is available under these programs. The department also has both research and training grants (traineeships and assistantships) focused on the pollution problems of irrigation return flow. The assistantships and traineeships are open to U.S. citizens.

Irrigation Engineering. Development of irrigation systems is one of man's oldest engineering endeavors, and it is even more important today than it was centuries ago. Irrigation makes arid land productive and provides great flexibility in cropping patterns, and thus will be a major factor in solving the world food problem. On the other hand, irrigation is the major consumptive user of water and is probably a major factor in the quality change in the waters of all streams providing irrigation. With the world food problems and water pollution in the spotlight, superimposed on a mounting demand for water by all users — irrigation, power, industry, municipal, culinary, navigation, recreation, fish and wildlife — the challenge facing the irrigation engineer has never been greater and his opportunities and future have never been brighter. In more than 75 years of irrigation engineering experience, USU has attained world-wide prestige through the successful professional records of its many graduates.

Irrigation Engineering begins with a basic understanding of the soil-plant-water relationships and includes the design of farm irrigation systems, as well as the design and construction of control, conveyance and distribution works. Proper consideration must be given to pollution problems, along with the economic, administrative, and social problems involved in irrigation development. Irrigation projects often require high dams, long tunnels, canals and pipe lines, and pumping plants. Irrigation projects must be integrated with other water uses. The irrigation engineer must give careful attention to efficiencies of conveyance, application, and consumption of available water. Irrigation engineering training at USU provides the broad base necessary for proficiency in any or all of these aspects of Irrigation Engineering.

Close interdepartmental association with Soils and Meteorology, Civil Engineering, and Botany is achieved to strengthen the program of those wishing special emphasis in these aspects of the science.

Agricultural and Irrigation Engineering Courses

Undergraduate

110. (10) Irrigation Practice. Primarily for agricultural students. Efficient use of water, water measurement, farm surveying. Three lectures, one lab. (4Sp) **Bach, Daines**

308. (108) Engineering Aspects of Soil and Water Conservation. Extent and kinds of erosion, rates of water absorption, soil erosibility, vegetation and cultural practices. Erosion control structures, surveys for hydraulic designs for terraces, terrace outlets and soil saving dams. Tillage and farming methods, strip-cropping, erosion and alkali problems on irrigated land. Three lectures, one lab. (4F) **Daines, Stringham**

310. (110) Irrigation Principles. Primarily for students in Agriculture and colleges other than Engineering; surveying, water measurement, conveyance and application, consumptive use of water and water requirements, pumping, drainage, and soil-water relationships. Prerequisite: Math 101. Two lectures, one lab. (3F) **Bach, Keller**

343. (143) Irrigation Principles. For advanced Engineering students. Soil-water-plant relationships; water requirements; efficiency of water use, flow of water in soils; effects of irrigation on water quality. Prerequisite: Civil Engrg 553 or 442, or Math 222 and instructor's consent. Two lectures, one lab. (3F) **Keller, Willis**

498. (198) Senior Problems. Independent study of a selected theoretical problem laboratory analysis, or field engineering problem utilizing an applied science background in an area related to Agricultural Engineering. Formal typewritten reports are required. (3F, W, Sp) **Staff**

545. (145) Surface and Subsurface Drainage. Open and covered drains, and drainage by pumping from wells. Soil properties, land reclamation, salinity problems and drain construction. Prerequisite: Civil Engrg 553 or 442. Three lectures, one lab. (4Sp) **King**

546. (146) Water Conveyance and Control. Fluid and soil mechanics are applied to problems of water conveyance and control, including canals, flumes, transitions, pipe lines, diversions, drops and chutes, spillways, checks and headgates. Prerequisites: Civil Engrg 553 or 442, 430 concurrently Civil Engrg 406. Three lectures, one lab. (4Sp) **Unhanand, Stringham**

547. (147) Sprinkler Irrigation Design. Includes sprinkler head types, characteristics and design; pump and pumping plant characteristics and design; sprinkler systems planning and layout; economic aspects of design and operation; system maintenance, operation and management. Prerequisites: Ag Engrg 343 or Math 222 and approval of instructor. (3W) **Keller**

548. (148) Farm Irrigation Systems Design. includes open ditch and pipe line distribution systems for application of water by surface methods. Prerequisites: Ag Engrg 343 and Civil Engrg 553 or 442. (3Sp) **Bishop, Stringham**

549. (149) Water Law and Institutions. Law governing the acquisition, adjudication and administration of water rights, state water codes, interstate compacts, international agreements, federal water laws and legislation, irrigation institutions, conservancy districts, water pollution control districts, state and local organizations. Three lectures. (3F) **Jeffs**

560. (160) Water Management. Organization and administration of conservancy districts, metropolitan districts and other water distribution institutions. Distribution of water, financing for construction and operation, maintenance of canals, flumes, pipe lines, dams, regulating reservoirs, and other water facilities. Three lectures. (3W) **Milligan, Stringham**

Graduate

673. (273) Special Problems in Agricultural Engineering. Independent study of chosen problems in Agricultural Engineering. Standard, formal typewritten reports required. Credit arranged. (F, W, Sp, Su) **Staff**

674. (274) Special Studies in Agricultural Engineering. Independent study of specialized subject matter as approved by the department. Credit arranged. (F, W, Sp, Su) **Staff**

680. (299) Seminar. (1F, W, Sp) **Staff**

697. (298) Thesis Research MS. Credit arranged. (F, W, Sp, Su) **Staff**

698. (298) Research Consultation MS. Credit arranged. (F, W, Sp, Su) **Staff**

699. (400) Continuing Registration MS. (3F, W, Sp, Su) **Staff**

731. (231) Irrigation Science. Topics include: water quality and irrigation practices, economics and irrigation practices, soil-water relations, water-soil-plant relations, evapotranspiration and irrigation of principal crops. Prerequisites: Ag Engrg 343, Soils 470 or instructor's consent. (3W) **Bishop, Keller, Milligan**

732. (232) Sprinkler Irrigation Engineering. Economic selection of irrigation systems pumps and pumping plant analysis, water hammer and surge, uniformity of application, application rate and intensity, pipe line economics, screening and inlet devices, and special appli-

cations of sprinkler methods. Prerequisite: Ag Engrg 547 or instructor's consent. (3Sp) **Keller**

733. (233) Surface Irrigation Engineering. Hydraulics of flow in furrows, hydraulics of flow in borders, uniformity of application, application efficiency, effects of irregular slopes, use of computers in land leveling calculations, reclamation, and waste disposal. Prerequisites: Ag Engrg 548, 731. (3F) **Bishop**

735. (235) Irrigation Return Flow. Water pollution problems associated with the practice of irrigation. The role of irrigation in producing water quality changes, the nature of changes, and the use of irrigation as a method of water quality renovation. Prerequisite: Instructor's consent. (3W) **Peterson**

745. (245) Advanced Design of Drainage Systems. Measurements of field permeability, hydraulics of wells, pumping for drainage, leaching and reclamation of saline soils, etc. Prerequisite: Ag Engrg 343, 545. (3F) **King**

780. (299) Seminar. (1F, W, Sp) **Staff**

797. (298) Dissertation Research, PhD. Credit arranged. (F, W, Sp, Su) **Staff**

798. (298) Research Consultation, PhD. Credit arranged. (F, W, Sp, Su) **Staff**

799. (400) Continuing Registration, PhD. (3F, W, Sp, Su) **Staff**

**Department of*

Animal Science

Head: Professor James A. Bennett

Office in Agricultural Science 232

Professors Clair R. Acord, Jay O. Anderson, John E. Butcher, C. Elmer Clark, Carroll I. Draper, Warren C. Foote, Lorin E. Harris, Doyle J. Matthews, Joseph C. Street, Don W. Thomas

Associate Professors Donald C. Dobson, Grant M. Esplin, Milton A. Madsen, Darrell H. Matthews, Hyrum Steffen, Norris J. Stenquist

Assistant Professors Tedford A. Gillett, R. Morrell Mathis, Nyle J. Matthews

Research Associates Sherman J. Atkinson, Paul V. Fonnesbeck, Leonard C. Kearl

Research Assistants Sullivan Blau, Robert E. Warnick

Lecturer Martin H. Gonzalez

Degrees: Bachelor of Science (BS), Master of Science (MS), Doctor of Philosophy (PhD)

Majors: Animal Science, Animal Breeding, Nutrition, Physiology, and Management

A student majoring in Animal Science may obtain a Bachelor of Science degree under one of three curricula: science, production, or business.

The science curriculum will prepare students for graduate work or technical employment in research, teaching or extension work in a university, in industry, or in government, or for the positions listed under the production curriculum. Students who have high scholastic standing and marked ability in the fundamental sciences will find excellent opportunities in this area.

The production curriculum prepares students to be farm or ranch operators or managers in livestock

*In College of Agriculture.

or poultry county agents, or to take positions related to livestock or poultry raising with various other commercial, state, and federal agencies.

The business curriculum gives training in the business phases of livestock and poultry production and gives background for employment with commercial companies associated with these enterprises.

Undergraduate Study

Lower Division. Suggested course of study for the first two years for **all** curricula is as follows:

FRESHMAN YEAR

Courses	Credits
Animal Science 100, 102	3
English 101, 102, 103	9
Math 101, 105, 106	11
Ag Economics 201, 202, 230, or equivalent	9
Social Science or Humanities	10
Biological Sciences	5
MS, AS or PE	3
	50

SOPHOMORE YEAR

Animal Science 261, 262	2
Chemistry 111[1], 112[1], 116[1], or 111, 112, 141	15
Veterinary Science 120	5
Social Sciences or Humanities	15
Biological Sciences	10
MS, AS or electives	3
	50

[1]These courses are required in the science curriculum. They are recommended but not required in the other curricula.

Upper Division. Suggested course of study for the Junior and Senior years in the science curriculum:

JUNIOR YEAR

Animal Science 440, 441, 442, or 447, 450, 520	15
Soils 358	5
Chemistry 331, 332	8
Biology 512	5
Exact Sciences to be selected from Math 220, 221, 222, 223; Physics 211, 212, 213 or 221, 222, 223	20
	53

SENIOR YEAR

Animal Science 470, 490, 560, 561 562, 575	10 or 18
Chemistry 360, 370	9
Physiology 501, 502	10
Veterinary Science 300	4
Plant Science 432 or Range Management 340	3 or 4
Electives	6
	43 or 50

Suggested course of study for the Junior and Senior years in the production curriculum:

JUNIOR YEAR

Animal Science 365, 440, 441, 442 or 447, 450, 520	18
Soils	4
Biology 512	5
Plant Science 432	4
Dairy Science	3
Library Science 501	3
Irrigation 310	3
Electives	12
	52

SENIOR YEAR

Animal Science 320, 470, 490, 560, 561, 562, 575	21
Veterinary Science 300	3
Entomology 539	5
Applied Statistics 351	5
Range Management 340	3
Business 135, 151, 435	8
Ag Education 351	3
Electives	4
	52

Suggested course of study for the Junior and Senior years in the business curriculum:

JUNIOR YEAR

Animal Science 365, 440, 441, 442 or 447, 450, 520	18
Soils 358	4
Biology 512	5
Plant Science 432, or Range Management 340	3 or 4
Ag Economics 510, 517, 535	9
Accounting 201, 202, 203	9
Electives	1-3
	50-52

SENIOR YEAR

Animal Science 490, 560, 561, 562, 570, 575	18
Ag Economics 520, 535	6

Business Administration 135, 151, 435	10
Electives	16
	50

Graduate Study

Course work and research leading to the Master of Science and the Doctor of Philosophy degrees are offered. Specialized fields of study for the Master of Science and Doctor of Philosophy degrees include: Animal Breeding, Nutrition, Physiology, and an MS in Management. Facilities are available to conduct research with farm animals, poultry, and laboratory animals. In cooperation with other departments, the Master of Science and Doctor of Philosophy degrees are offered in Animal Nutrition and Biochemistry.

Detailed information on graduate programs in Animal Science may be obtained from the department or from the dean of the School of Graduate Studies.

Animal Science Courses

Undergraduate

100. (50) Current Developments in Animal Husbandry. Review and discussion of recent developments in the field of Animal Husbandry. Required of all students during the first quarter in attendance. (1F) **Bennett**

101. (1) Fundamentals of Animal Husbandry. Livestock production in relation to other phases of agriculture; factors affecting livestock distribution and adaptability; functions performed and products produced; an introduction to important factors in successful livestock production. (3F, Sp) **Steffen**

102. (2) Animal Husbandry Laboratory. Exercises in judging, classifying, and grading livestock including practical problems. (2F, Sp) **Steffen**

160. (35) Western Horsemanship. Grooming, saddling, bridling, mounting, seat and hands, horseback riding both bareback and on western saddle. For students with limited or no previous riding experience. Three laboratories. $15 fee. **Staff**

240. (10) Feeds and Feeding. A study of the nutrients and nutrient requirements of farm livestock; comparative physiology of digestion; values and uses of major feeds; balancing of rations and feeding of farm animals. (5W) **Steffen**

260. (30) Horse Husbandry. Breeding, feeding, care and management of horses. (2Sp) **Bennett**

261, 262. (41, 42) Livestock Practicum. Development of skills in the feeding, care, fitting, and showing of beef cattle, sheep and swine. Two labs. (1W, 1Sp) **Madsen**

320. (143) Artificial Insemination of Domestic Animals. A laboratory course designed to teach the principles and practices of artificial insemination. Course qualifies the student for Utah State Artificial Insemination License. One lab. (1Sp) **Foote**

365. (165) Livestock Judging and Selection. Animal form and its relation to function. Emphasis on judging for both commercial and show ring purposes. The livestock judging team is selected from students taking this course. Prerequisite: An Sci 102. Three labs. (3F) **Madsen**

390. (123) Special Readings in Animal Science. Available by permission of department head and instructor. Credit arranged. (F, W, Sp, Su) **Staff**

440, 441. (150, 151) Principles of Nutrition. Nutrient utilization and requirements of farm animals, nutritional diseases and a consideration of investigational method. Prerequisite: Chemistry 141 or concurrent registration. (3F, 3W) **Street**

442. (152) Applied Animal Nutrition. Animal function, i.e. maintenance, growth, reproduction, lactation; feeding standards required for optimum livestock production. Feed formulation and feeding systems for various animal functions. Prerequisite: An Sci 441. Two lectures and one lab. (3Sp) **Butcher**

443. (153) Range Animal Nutrition. Application of the principles of animal nutrition to range livestock; definition and use of animal function, feeding standards, nutritional value of range forage, nutrient deficiencies, and feed formulation. Credit will be given for Animal Science 442 or 443, not both. Prerequisite: An Sci 441. Two lectures and one lab. (3Sp) **Butcher**

447. (107) Applied Poultry Nutrition. Prerequisites: An Sci 440, 441. (3Sp) **Anderson**

450. (155) Animal Breeding. Application of genetics to improvement of farm animals. Breeding systems, selection and inheritance problems in large farm animals. Prerequisites: Veterinary Science 120, Biology 512. Three lectures. (3Sp) **Bennett**

470. (185) Meats. Cutting, selection, and identification of wholesale and retail cuts of beef, pork, and lamb. Prices, relative econ-

*Taught 1971-72.

omy, uses, nutritive value, chemical composition, and palatability. Preparation of meats for the home freezer is emphasized. (3W) **Gillett**

490. (160) Livestock Production Problems. Discussions dealing with special problems of major current importance in livestock production. Prerequisites or concurrent registration: An Sci 442, 450. (3Sp) **Staff**

520. (142) Reproduction of Domestic Animals. A study of physiology of reproduction and methods of control as applied to domestic animals. Prerequisites: Veterinary Science 120 or Physiology 130 and a course in organic chemistry. Two lectures, one lab. (3Sp) **Call, Foote**

560. (110) Beef Production. Organization of the enterprise, breeds of cattle, selection of breeding stock, production of maximum calf crop, handling and feeding animals of different ages on the range and in the feed lot and marketing of surplus stock. Prerequisite: An Sci 442. (3F, Sp) **Madsen**

561. (120) Swine Production. Functions and kinds of swine enterprises; breeding, management and feeding of the breeding herd and market swine. Prerequisite: An Sci 442 or equivalent. (3W) **Steffen**

562. (125) Sheep Production. Emphasis on range production. Methods of production of lambs and wool, grading and marketing practices, feeding and studies of the breeds and their adaptation to the different husbandry practices. Prerequisite: An Sci 442. (3Sp) **Madsen**

575. (175) Wool Technology. Marketing and manufacturing of wool and laboratory techniques used in studying wool. (3W) **Madsen**

Graduate

620. (242) Reproductive Physiology. A study of the processes of reproduction in mammals including mechanisms of control. Prerequisites: Physiology 501, 502, Zoology 557 or equivalent and a course in organic chemistry. Three lectures, one lab. (4W) **Call, Ellis, Foote**

****640. (214) Animal Nutrition.** Measures for nutritional value of feed, nutrient requirements of animals, and the cause, detection, treatment, and prevention of nutritional diseases. Prerequisite: An Sci 441. (3W) **Harris**

****641. (210) Techniques in Nutrition Research.** An original project is completed with the objective of learning how to plan, conduct, and summarize research in animal nutrition. Prerequisite: An Sci 441. (2-6F, W, Sp) **Harris**

****642. (215) Nutrition Laboratory.** Review and practice in laboratory techniques used in nutrition research. Two labs. (2F) **Street**

680. (261) Animal Nutrition Seminar. May be repeated. (1F, 1W, 1Sp) **Staff**

681. (262) Animal Breeding Seminar. May be repeated. (1W) **Staff**

682. (263) Animal Management Seminar. May be repeated. (1Sp) **Staff**

684. (264) Animal Physiology. Seminar. May be repeated. (1F, 1W, 1Sp) **Staff**

685. (270) Nutrition and Biochemistry Seminar. Philosophy of research and technical information are included. Area of coverage rotates each quarter. May be repeated. (1F, 1W, 1Sp) **Staff**

690. (220) Special Problems in Animal Science. Readings, discussions, lectures, literature reviews, and research problems on animal breeding, nutrition, physiology, and management. Available by permission of the instructor. Credit arranged. (F, W, Sp, Su) **Staff**

697. (250) Research and Thesis. Credit arranged. (F, W, Sp, Su) **Staff**

699. (400) Continuing Master's Advisement. Credit arranged. (F, W, Sp, Su) **Staff**

797. (new) Research and Thesis. Credit arranged. (F, W, Sp, Su) **Staff**

799. (new) Continuing Doctor's Advisement. Credit arranged. (F ,W, Sp, Su) **Staff**

**Taught 1972-73.

*Department of

Applied Statistics-Computer Science

Head: Professor Rex L. Hurst

Office in Computer Science Building

Associate Professors Bartell Jensen, Eugene C. Kartchner, Wendell L. Pope, Donald W. Sisson, David White

Assistant Professors Ronald V. Canfield, Elwin G. Eastman

Instructor Karl Fugal

Degrees: Bachelor of Science (BS), Master of Science (MS)

Majors: Applied Statistics, Computer Science

The Department of Applied Statistics - Computer Science has as its primary interest the methods of applying mathematics to the solution of practical problems.

Students who have ability in mathematics and are curious about the world around them may well find a challenging and exciting future through the Applied Statistics - Computer Science Department.

Most staff members in the department are involved in consulting work with research workers both on and off campus. The research consulting activities of the statistics group and the data processing activities of the computer science group provide a large number of job opportunities for majors in these subjects. This allows them to apply the things they are learning in the classroom directly to practical problems.

The department requires its majors to maintain a g.p.a. of 2.5 or better in courses required in the major in order to remain in good standing.

Mathematics-Computer Science-Statistics Composite Teaching Major. The composite major strengthens the regular teaching major in Mathematics with applications of mathematics in operations research, statistics and computer science. The following is a list of the Computer Science and Statistics courses for this program:

Courses	Credits
Ap St 431 or 576, 577	10
CS 150, 380, 470 and at least two courses	11
from CS 350, 430, 440, 450	6

Math 561 is recommended as an additional Mathematics course.

Students interested in this program should also refer to Mathematics and Secondary Education Departments.

Applied Statistics

Statistics is that branch of science which deals with the development and usage of statistical inference. Statistical inference is the inductive process of generalizing from the particular to the general on the basis of sample evidence. The foundation of statistical inference lies in the theory of probability which provides a measure of reliability of the conclusions drawn from experimental data.

Experimental scientists in many fields of endeavor make extensive use of statistics as a research tool. Statistics provides the methodology for summarizing data, estimating parameters, testing of hypotheses, and formulating mathematical models to simulate physical and biological situations.

Applied Statistics majors are prepared for further graduate study or for accepting a wide choice of well-paid positions. Statisticians find employment as members of research teams in business, industrial concerns, the federal government, state governments, and private research groups. All of these provide outstanding possibilities for professional advancement.

Undergraduate Study

Bachelor of Science Degree. For a major in Applied Statistics students are expected to complete Applied Statistics 431, 432, 433 (576, 577, 578 or Math 571, 572, 573), and 497. Some credit should be taken in Special Problems 495. They are also expected to take extensive work in Mathematics or Economics and Computer Science.

Undergraduate Minor. An undergraduate minor in Applied Statistics is expected to complete at least 18 credits from the following courses: Applied Statistics 431, 432, 433, 576, 577, 578; Computer Science 340 or 380, 430, 440, 470.

Lower Division

FRESHMAN and SOPHOMORE YEARS

Courses	Credits
English 101, 102, 103	9
Physical Education	3
Math 106, 220, 221, 222, 223	25
Philosophy 210	5
Economics 200, 201	10
Applied Statistics 351	5
Physics (221, 222, 223) (111, 112, 113) Chemistry (111, 112, 141) (121, 122, 123)	15
Electives (including remainder of group requirements)	27
Total	98

Upper Division

JUNIOR and SENIOR YEARS

Applied Statistics 431, 432, 433, 495, 497, 576, 577, 578	32
Computer Science 380, 470	8
Math 441, 561	6
Electives	51
Total	98

JUNIOR and SENIOR YEARS

(Econometrics Minor)

Applied Statistics 576, 577, 578, 433, 495, 497	25
Computer Science 380, 470	8
Math 441, 561	6
Economics 500, 501, 540, 560, 580, 670, 671, 672	30
Electives (a selection from Math 324, 345, 421, 422, 423, 562, and Computer Science 430, 440 is recommended)	29
Total	98

Computer Science

Computer Science deals with information structures and processes as they are represented and implemented in modern high-speed digital computers, with information processing systems to make digital computers useful, and with applications of computing.

The program in Computer Science attempts to provide a basis of knowledge and a mode of thinking which will permit continuing growth on the part of graduates. Prospective students should have an aptitude for mathematics and logic and a bent for analysis and deduction.

The computer science area is one of the fastest growing fields of study in our society. Applications of computing are found in the space and aeronautics industries, in the sciences, in government and in many businesses, pro-

viding a wide range of employment opportunities.

Bachelor of Science Degree. The department offers a degree program with emphasis in either science or business. The objectives are to provide computer scientists who can relate to the science or business area.

Minor in Computer Science. A student desiring to minor in Computer Science should take CS 150, 380, and a selection from CS 350, 430, 440, 450, 490, 495, 550 to fill the 18 credits required.

Before a student can register in a Computer Science course he must earn a grade of "C" or better in all courses prerequisite to the given course.

Credit will not be granted for both CS 340 and CS 380.

Lower Division

FRESHMAN and SOPHOMORE YEARS

Courses	Credits
English 101, 102, 103	9
Physical Education	3
Math 106, 220, 221, 222	20
Economics 200, 201	10
Computer Science 150	3
Physics 221, 222, 223	15
Electives (including lower division requirements)	39
Total	99

Upper Division

JUNIOR and SENIOR YEARS
(Science Option)

Computer Science 350, 380, 430, 440, 450, 470, 475, 480, 510, three credits of 490 or 495, two quarters of 497	34
Math 223, 561	8
Applied Statistics 431, 432, or 576, 577	10
Upper Division Science or Engineering[1] (At least 20 hours must be in one area)	40
Electives	3
Total	95

JUNIOR and SENIOR YEARS
(Business Option)

Computer Science 350, 380, 430, 440, 450, 470, 475, 480, 510, three credits of 490 or 495, two quarters of 497	34
Applied Statistics 431, 432, or 576, 577	10
At least 30 credits from the following: Business Administration 441, 484, 511, 550, 560, 570. Accounting (201, 202, 203 or 501, 502) 411, 412, 431, 432 Economics 300, 301, 500, 501, 510, 571, 572 (At least 20 credits must come from one department)	30
Electives	21
Total	95

[1]Other upper division options will be considered on an individual basis.

Graduate Study

Master of Science Degree. The department offers the Master of Science degree in Statistics. The area of research includes: 1) development of new tools of statistical inference, 2) refinement of old techniques, 3) improvement and development of the design of experiments. Students will be encouraged to take a strong minor in Computer Science.

A student seeking an MS degree in Statistics should have either a BS degree in Statistics or a BS degree in Mathematics. Majors in fields of application with a strong background in Mathematics may also be considered.

Financial assistance is available in the form of graduate assistantships for outstanding candidates. USU also offers a limited number of research fellowships which are open to all majors.

Applied Statistics Courses

351. (51) Statistics with Computer Programming. Statistical inference, integrated with the use of digital computers for statistical analysis. Random sampling. Data editing. Populations and their parameters; frequency distributions, percentiles, the population mean and variance, the normal frequency distribution. Statistical inference for one population; estimates of population parameters, the correlation coefficient and its use. Computer programming for statistical problems. Statistical inference for two populations; hypothesis tests, "student's t" distribution, ranking of

population means. Prerequisite: Math 105. (5F, S) **Staff**

431, 432, 433. (131, 132, 133) Statistical Methods. Statistical methods for students without calculus. Descriptive statistics and probability, sampling, inferences about populations, estimation, hypothesis testing, regression and least squares, analysis of variance and covariance, experimental designs. Prerequisite: Math 105. 5(F, W, Su), 5(W, Sp, Su), 5(Sp) **Staff**

495. (198) Directed Reading. Independent study in statistics. Credit arranged. (F, W, Sp, Su) **Staff**

497. (199) Seminar. Review of current literature and developments in the field of statistics. (1F, W, Sp) **Staff**

576, 577, 578. (176, 177, 178) Statistical Methods with Theory. A combination of statistical methods and theory for students having a calculus background. Assumes no prior training in statistics. Probability, frequency distributions, functions of random variables, regression and correlation analysis of variance and covariance. (5F, W, Sp) **Canfield, Hurst, Sisson**

Graduate

610. (221) Industrial Statistics. Control of quality of manufactured products; attribute and variable inspection; single, double, and sequential plans; sampling plans for continuous production; cost function, and elementary decision functions. Prerequisites: Ap St 577 or 432. (3; taught on demand) **Staff**

615. (225) Non-Parametric Statistics. Nature and importance of non-parametric procedures. Non-parametric tests of hypothesis commonly encountered in statistical applications are considered. One sample test, two sample (independent and related). K sample analysis for independent and related samples. Measures of correlation and related tests. Prerequisite: A year of statistical methods. (3; taught on demand) **Canfield**

620. (233) Biological Statistics. Biological assays; quantitative and quantal responses; dosage response relationships; parallel line and slope-ration assays, relative potency and LD 50; biological populations and transformations. Prerequisite: Ap St 432. (3; taught on demand) **Sisson**

630. (291) Analysis of Variance-Covariance. Analysis of variance techniques commonly encountered in many fields of research. Variance components; nested and crossed relationships between factors; generalized methods of obtaining expected mean-squares in analysis of variance; analysis of covariance; data with unequal numbers of observations in subclassifications; utilization of appropriate computer programs. Prerequisite: Ap St 434. (3F) **White**

635. (292) Linear Statistical Models. Theory and methods of correlation, regression and least squares analysis experimental data. Prerequisite: At least a year of statistical methods or a half year of statistical theory. (3W) **Hurst, White**

640. (240) Applied Probability and Random Processes. Set theory, events, axioms of probability, distribution and density functions; probability laws; random variables, transformations, expectation, moments, characteristic functions; stochastic processes, statistical description, linear and non-linear transformations; correlation, power spectra; stationary and non-stationary processes; applications in engineering. Prerequisites: Math 223, Electrical Engineering 615 or equivalent, concurrent or prerequisite. (4F) **Staff**

645. (241) Time Series. Analysis of quantitative data, obtained sequentially through time. Tests for statistical independence. Moving averages; auto regressive models; analysis of seasonal effects. Auto-correlations; the periodogram; elementary harmonic analysis. Prerequisite: A year of statistical methods. (3F) **Staff**

650. (261) Intermediate Theory of Statistics. Probability theory; basic notion of sets, sample description space, events, algebra of events, probability of an event, probability theorems, combinational analysis, conditional probability, Bayes' Theorem, independent events, independence of several events, random variable, probability functions, distribution functions, discrete distributions; Bernoulli trials, binomial, multinomial, hypergeometric, Poisson, negative binomial distributions, limiting theorems, continuous distributions, probability functions for continuous variate, multivariate distributions, transformations, expectation of a random variable, expectation, moment, moment-generating functions, moments of multivariate distributions. Prerequisites: Math 223, 441, or take concurrently. (5F) (See Math 571.) **Staff**

651. (262) Intermediate Theory of Statistics. Important continuous distribution, uniform, normal, gamma, beta distribution and others, inductive inference; populations and samples; Chebyshev's inequality; law of large numbers; central limit theorem; point estimation; optimum properties of estimators; principle of maximum likelihood; multivariate normal distribution, bivariate normal, multivariate normal marginal and conditional distributions, moment-generating functions, derived distributions; distributions of functions of random variables, Chi-square, student's F distributions; large sample theory, asymptotic distributions of maximum likelihood estimators. Prerequisite: Ap St 650. (5W) (See Math 572.) **Staff**

652. (263) Intermediate Theory of Statistics. Interval estimation, confidence limits, fudicial limits, confidence interval and regions for parameters of well-known distributions, test of hypotheses: regression and linear hypotheses; analysis of variance; sequential tests of hypotheses and distribution-free models. Prerequisite: Ap St 652. (5Sp) (See Math 573.) **Staff**

660. (282) Multivariate Analysis. The multivariate normal. Conditional distributions for multinormal variates. Hotelling's T^2. Discriminant functions. Multivariate analysis of variance. Canonical correlation. Factor analysis. Prerequisite: Ap St 630. (3W) **Staff**

665. (250) Computer Applications in Statistics. Using Monte-Carlo methods to generate data according to mathematical models, experimental design data, regression data; analysis of regression data, multiple regression, generalized curve fitting; generalized analysis of covariance; multivariate analysis of variance and covariance; factor analysis; canonical correlation; discriminant functions. Prerequisite: FORTRAN. (3Sp) **Hurst**

670. (293) Analysis of Categorical Data. Information theory. Analysis of information in two-way contingency tables; n-way contingency tables. Regular Markov chains. Statistical analysis of Markov chains. Data processing for analysis of categorical data. Prerequisite: Two quarters of mathematical statistics. (3Sp) **Staff**

695. (298) Reading and Reports. Individual study and report preparation in areas of special interests. Training in professional consulting. Credit arranged. (F, W, Sp, Su) **Staff**

697. (297) Thesis and Research. Outlining and conducting research in statistics. Thesis preparation. Credit arranged. (F, W, Sp, Su) **Staff**

699. (400) Continuing Graduate Advisement. Credit arranged. **Staff**

Computer Science Courses

150. (11) Introduction to Computer Science. Methods of collecting and processing information. Manual and automated data collection systems. The use of digital computers in data processing and scientific computing. The structure and usage of computer based languages. History and philosophy of computing. **(3F, W, Sp, Su) Staff**

340. (151) Computer Programming (FORTRAN). Use of a problem-oriented programming language in solving problems by means of a computer. For non-Computer Science majors. (3F, Su) **Staff**

350. (158) Programming Business Problems (COBOL). Students are expected to learn the fundamentals of COBOL and gain experience in writing COBOL programs for the purpose of solving problems in their own areas of interest through the use of a computer. Prerequisite: CS 150 or instructor's consent. (3W, Sp, Su) **Kartchner**

380. (167) Programming Scientific Problems. Use of a problem-oriented language to write programs for a computer. Students are expected to learn a programming language (such as FORTRAN) and to solve problems in their own fields using a computer. Prerequisite: Math 221, CS 150 or instructor's consent. (3W, Sp, Su) **Staff**

430. (171) Computer Structure. Organization of computers in terms of input-output storage, control and processing units. A discussion of register and storage structures and addressing techniques. Digital representation of data for machine arithmetic, character handling and error detection and correction. Instruction format and execution, principle instruction types, program control, input-output operations and interrupts. An introduction to symbolic coding and assembly systems. Prerequisite: CS 150 or programming experience. (3F, W) **Staff**

431. (173) Computer Operations. A laboratory course in operating systems, use of operator's console, magnetic tape units, disk storage drives, input-output units. To accompany or follow CS 430. (1F, W, Sp, Su) **Staff**

440. (172) Computer Programming. Assembly level languages for programming digital computers. Prerequisite: CS 430. (3Sp) **Staff**

450. (159) File and I/O Management. The organization and usage of large data files. Advanced techniques in the use of storage and input-output devices. Prerequisites: CS 150, 350. (3Sp) **Staff**

470. (175) Operations Research: Methods and Problems. Inventory, replacement, waiting lines, competitive strategies, allocation, and sequencing. Prerequisite: Statistical Methods. (5F) **Staff**

475. (178) Data Structures. Basic concepts of data. Linear lists, strings, arrays, and orthogonal lists. Representation of trees and graphs. Storage systems and structures, and storage allocation and collection. Multilinked structures. Symbol tables and searching techniques. Sorting (ordering techniques). Formal specification of data structures, data structures in programming languages, and generalized data management systems. Prerequisite: CS 430. (3W) **Staff**

480. (181) Progamming Languages. Formal definition of programming languages, including syntax and semantics. Simple statements including precedence, infix, prefix, and postfix notation. Global properties of algorithmic languages, including scope of declaration, storage allocation, grouping of statements, binding

time of constituents, subroutines, coroutines, and tasks. List processing and string manipulation languages. Run-time representation of program and data structures. Prerequisite: CS 430. (3W) **Staff**

490. (196) Special Projects. Analysis and programming of special problems. Prerequisite: Instructor's consent. Credit is arranged. (F, W, Sp, Su) **Staff**

495. (new) Directed Reading. The student will study new developments in the field and material not available in current course work. Prerequisite: Instructor's consent. Credit is arranged. (F, W, Sp, Su) **Staff**

497. (197) Seminar. Review of current literature and developments. (1F, W, Sp) **Staff**

510. (182) Systems Programming. Review of batch-processing monitors, their components, operating characteristics, user services and limitation. Implementation techniques for parallel processing of input-output and interrupt handling. Overall structure of multiprogramming systems. Details on addressing techniques, core management, file system design and management, system accounting, and other user services. Prerequisites: CS 440, 475. (3Sp) **Staff**

515. (190) Systems Analysis. Design and implementation of information systems. Sources of data, report objectives, making recommendations and presenting alternatives, equipment determination, testing of system, training programs and installation. (3Sp) **Burnett**

**Department of*

Art

Head: Professor Harrison T. Groutage

Office in Mechanic Arts 110

Professors Jessie Larson, Gaell Lindstrom, Everett C. Thorpe, Twain Tippetts

Associate Professors Jon Anderson, Ralph T. Clark, Larry Elsner

Assistant Professors Marion R. Hyde, Adrian Van Suchtelen

Instructor Glen L. Edwards

Degrees: Bachelor of Arts (BA), Bachelor of Fine Arts (BFA), Master of Arts (MA), Master of Fine Arts (MFA)

Majors: Advertising Design, Art Education, Ceramics, Fabric Design, Interior Design, Jewelry and Metalsmithing, Painting, Drawing, Photography, Printmaking, Sculpture, Illustration

The Art Department at USU boasts a long tradition of excellence and leadership in various art disciplines. The professional posture of its faculty and the record of its graduates not only indicate this but are also a constant source of pride to the department.

Following completion of the basic classes, art students may specialize in any of the major areas listed above.

The department requires the exhibition of work by student majors, and regularly sponsors exhibits by staff and outside artists shown in the gallery of the new Fine Arts Center and in the new University Art Gallery located in the Library. It promotes appreciation of visual arts on the campus also by sponsoring murals, paintings, sculpture, and other works for campus buildings and by supervising acquisition to and placement of the University's permanent art collection.

*In College of Humanities, Arts and Social Sciences.

General Education Requirements. Several courses are offered which satisfy the Humanities and Art group requirements: Art 101, 105, 165, 167, and 365.

Undergraduate Study

Bachelor of Arts Degree. Art majors should complete all general education lower division requirements, the modern language requirement, and the basic art group by the end of the Sophomore year. This will allow concentration in studio art during the Junior and Senior years. They must satisfactorily complete the group of basic Art courses: Art 101, 102, 103, 120, 122, 125, 160, 167, 189 with at least a "B" average for the group. Grades of "D" will not be acceptable. Courses receiving this grade must be repeated without credit. Art 120, 122, and 125 are fundamental prerequisites and should be completed before registering for other studio classes.

Art majors must complete requirements for one of the majors listed on pp. 94-97 and an approved minor or composite major, with the permission of the major adviser and the head of the department. The detailed outline of course requirements for each of these specializations is available at the Art Department office. The major professor may also prescribe other courses to serve the particular needs of different students.

The following curriculum is suggested for Art majors:

FRESHMAN YEAR

	Credits		
	F	W	Sp
Art 101	3		
Art 102, 120, or 125	3		
Freshman Art Seminar	1		
Art — Basic Group		3-6	3-6
Freshman English	3	3	3
PE, MS, or AS	1-2	1-2	1-2
Lower Div. Sciences, Soc. Sciences and Humanities	3-6	3-6	3-6

SOPHOMORE YEAR

	F	W	Sp
Art — Basic Group	3-9	3-9	3-9
Art 167 (Paleolithic through Classical)	3		
Art 167 (Medieval through High Renaissance)		3	
Art 167 (Baroque through Modern)			3
Lower Div. Sciences, Soc. Sciences and Humanities	6-9		
Electives	3		

JUNIOR YEAR

	F	W	Sp
Major Art Area	6-9	6-9	6-9
Art Composite or Minor	3-6	3-6	3-6
Electives (any area)	3-6	3-6	3-6

During the final quarter, before graduation, each student will participate in a Senior Exhibition. The best works created during the Junior and Senior years should be retained for this important exhibition. These may include paintings, drawings, sculpture, handcrafts, commercial designs, etc. They should be well framed or displayed in such a manner that a student's understanding of quality work and well-designed presentation are evident.

The Art Department faculty reserve the right to retain any student works of their choice for purpose of display and exhibition and addition to the permanent collection.

Bachelor of Fine Arts Degree. This is a professional Art degree requiring above-average accomplishment in art, intensive application and the consistent production of creative works of high quality. There are no modern language requirements.

General education requirements and the basic Art group must be completed in the Freshman and Sophomore years so that students can devote their Junior and Sen-

ior years to intensive work in studio art in the areas of their specialization.

Instead of the usual major and minor requirements, students for this degree are required to satisfactorily complete a composite Art major in closely related art areas. For instance, he may choose Sculpture for his first major and must complete courses stipulated in the outline available in the Art Department office. He may then choose Ceramics for his second major and must complete, with the approval of his adviser, at least 30 credits from the outline of courses for that area. This is a highly individualized program of study, and major advisers will establish the specific requirements of greatest value to each individual student. The basic Art group, Art 101, 102, 103, 120, 122, 125, 160, 167 (nine credits), and 189 must be completed with at least a "B" average. Design courses Art 102 and 103, and Painting and Drawing courses 120, 122, and 125 should be completed before registering for other studio courses.

Only students demonstrating considerable promise will be accepted for this more demanding professional degree. Transferring students may be asked to submit a portfolio and must demonstrate the same level of proficiency as USU undergraduates in Art.

All BFA students are also required to participate in a Senior Seminar and Exhibit during the final quarter before graduation.

Art Minor Requirements

The requirements for a minor in Art are flexible and can be completed in any area of specialization.

Generally, the minimum requirements include: Art 101, 102, 120, 125, plus three credits from the Art History group (165, 167, and 365) and three credits from the Crafts group (115, 145, and 150).

USU does not offer an Art teaching major for secondary teachers. Students choosing to train for teaching art in high school must complete the Art Education major listed below and a second major in a studio area of his choice.

Art Majors

Advertising Design Major. One of the most vital areas of art, Advertising Design, keeps constant pace with our economy. It is through the creative work of successful designers that products are advertised and sold. Courses place heavy stress on design and layout. To prepare for a professional job in this field, one must acquire proficiency in lettering, design, rendering techniques, and production methods. He also prepares a portfolio of work to show prospective employers his ability to produce tasteful and imaginative solutions to advertising problems.

In addition to the basic Art group, Advertising Design majors are required to take the following: Art 130, 131, 135, 140, 141, 142, 302, 330, 331, 530, 540, 555, and Business Administration 550. Additional recommended classes to be selected on consultation with advisers are: Business Administration 451, 453, and 458.

Illustration Major. Illustrations are graphic communications. To prepare for this profession, the student must become a competent draftsman and painter and must also understand perspective, anatomy and graphic techniques. The student must be able to research a problem, create compo-

sitions that communicate empathy to the viewer, and interpret emotions to bring off a successful illustration. A portfolio is prepared to show to art studios for prospective employment. Illustration majors are required to take the following: Art 121, 126, 131, 135, 140, 160, 302, 321, 521, 527, 535, and 555.

Ceramics Major. Ceramics as taught at USU is an important part of artist training recognized by both the artist and industry. The University has one of the most complete and well-equipped ceramics workshops in the nation. Excellent tools and equipment are provided for each student. The lab is accessible during the day for classes and special work as well as for evenings. Special high-fire kilns are available for student work as well as a variety of clays and glazes. Programs in this area are designed to fit needs of individual students, both beginning and advanced. In addition to the basic Art group, Ceramics majors are require to take Art 115, 116, 145, 160, 315, 345, 515, 516, 360, plus additional classes to be prescribed by the major professor.

Drawing Major. The discipline of drawing has always been considered to be of primary importance as a solid basis toward the understanding of the problems involved in visual arts. It includes the study of form and space, the exploration of graphic elements and visual dynamics, and most importantly, the search for an artistic order.

To the artist working in whatever chosen media, drawing offers a means toward understanding form and the visualization of particular concepts. To the draughtsman involved with drawing as an end in itself, it can mean creating with technical media simplicity, works of expressive power, complex imagery and thought, thus making drawing a significant artistic experience. In addition to the basic Art courses, drawing students are required to take Art 121, 122, 320, 321, 521, 522. Additional classes prescribed are Art 160, 555, 559, 360, 560.

Fabric Design Major. Through the ages man has employed fabrics for dual purposes of utility and aesthetic expression. In today's living, fabrics are achieving an increasing importance and their traditional uses in personal adornment and home furnishings are expanding. Fabrics have become essential units in contemporary architectural and industrial design. New commercial products constantly suggest new areas of interest for the weaver and fabric designer. Students develop creative fabric design projects which include experimentation with new fibers and techniques of enrichment both applied and structural, and give fresh and original application to known and satisfactorily proven techniques. In addition to the basic Art courses, Fabric Design majors are require to complete the following: Art 105, 150, 155, 350, 351, 352, 353, 354, 550, 551, and Clothing and Textiles 224. Additional prescribed classes are to be selected on consultation with the student's adviser.

Interior Design Major. Never before has there been such widespread interest in home planning nor such varied materials from which to choose. Interior Design courses are planned to help those who wish to make their own home appropriate to their kind of family life as well as to prepare adequately those who wish to enter the interior design field professionally. In addition to the basic

Art courses, Interior Design majors are required to take the following: Art 105, 126, 130, 150, 305, 306, 350, 351 or 352, 353 or 354, 405, 505 and Clothing and Textiles 224. Additional prescribed classes will be selected on consultation with the student's adviser.

Jewelry and Metalsmithing Major. Various metals provide exciting possibilities for the creative artist. For centuries molten metal has been used to cast jewelry. Sheet metal can be formed by hammering into exciting functional and aesthetic forms. Welding techniques can be used to express art concepts of a three-dimensional nature. In addition to the basic Art courses, Jewelry and Metalsmithing majors are required to take: 145, 160, 321, 521, 115, 116, 345, 445, 545, 320, 360, plus additional classes according to the individual needs as prescribed by the major professor.

Painting Major. When most people think of art, they generally have painting in mind. Contemporary artists are utilizing all of the historical approaches to painting and are exploring new ideas, techniques, and materials to make new contributions. A student is not required to follow any one approach to painting, but his own individuality is encouraged. In addition to the basic Art courses, the following are required: Art 121, 126, 160, 321, 325, 326, 521, 522, 525, 526, 527, 555, 559. Additional classes prescribed are Art 105 and 115.

Photography Major. Photography is one of the most recent fine art forms. National and international exhibits of photographs in color and black and white have aroused great interest. There are many opportunities for photographers in the commercial world of advertising illustration, industry, portraiture, medicine, and the sciences. Photography majors, therefore, approach their medium from the standpoint of a professional in not only the commercial world but also in the fine arts. They are required to take the basic Art courses outlined under the BA and BFA requirements, with attention directed to the composite major requirement as stated under the BFA degree. Photography courses should include Art 140, 141, 142, 143, 144, 340, 540, 541, 542, and 543. To develop professional competence, several of these upper division studio courses should be repeated for additional credit.

Students planning to operate their own photography studio as a business would find the following classes advantageous: Psychology 351, Sociology 101, Landscape Architecture 107, Journalism 430 (writing feature articles), Accounting 305, and the following Business Administration classes: 511, Management Concepts; 560, Personnel Administration; and 441, Financial Institutions.

Upon entering this program, each Photography major should immediately obtain his own light meter and, soon afterward a medium format camera (120 or 620), and a sturdy tripod. By the time he has attained Junior class standing, he should be able to purchase a 4 x 5 view camera (with swings and tilts), and at least six film holders and hangers. We recommend an eight-inch lens for the camera.

Photography students will submit their best black and white and color prints for the Senior Exhibit given during the final quarter before graduation in conjunction with other art students.

Printmaking Major. Printmaking is enjoying a powerful renaissance in America at present. Prints are competing with other art forms as they never have before and they give artists and collectors advantages that other art forms do not. Printmaking has often been man's most powerful vehicle for communicating the artist's own concepts and ideas. It is also demanding in that it encompasses so many other art activities. To make a fine print a student must draw, design, carve, and print. In addition to the basic Art courses, Printmaking majors are required to take: Art 121, 155, 320, 321, 326, 525, 555, and at least nine credits of 559, plus additional courses prescribed by the major professor.

Sculpture Major. The concern of the sculptor is basically the same as that of any other artist. The artistic statement that is embodied in the relationship between form and space is paramount. One must, of course, know materials and how they are controlled. An understanding of drawing and design is helpful in developing ideas. In addition to the basic Art courses, Sculpture majors are require to complete satisfactorily with a "B" average the following courses: Art 116, 121, 145, 160, 321, 521, 360, plus additional courses based on individual needs as recommended by the major professor.

Fine Arts Tour

Art majors and minors should plan to participate in some of the excellent fine arts tours available. These include the annual Fall tour to San Francisco to art galleries, museums and to attend operas, Broadway plays, and musicals. The annual Fine Arts Tours to Europe and Mexico are conducted during Spring and Summer Quarters. These tours are planned for a maximum learning experience and are possible at minimum cost. Up to nine University credits may be earned on these summer tours and 15 credits for the Spring Quarter in Mexico. Detailed information is available in the office of the Director of Tours or in the Art Department office.

Graduate Study

Opportunities for graduate study are available in many areas of the Art Department. Students may choose to qualify for either the general or more liberal Master of Fine Arts degree.

Master of Arts Degree. This is the liberal studies degree in Art at the graduate level. General requirements are listed in the graduate section of the General and Graduate Catalogs. Required in this degree is a proficiency in one or more foreign languages to be approved by the Department of Languages.

Master of Fine Arts Degree. This is a specialized professional degree. The College Art Association of America approves the MFA degree rather than a PhD degree as the terminal degree in the studio arts. An exceptional student devoting full time might qualify after five quarters in residence for the degree, but it generally requires an average of two years to satisfactorily complete this degree. The accumulation of credits and the number of quarters in residence are not major factors in the completion of this degree. However, minimum credit and resident credits must be completed. Emphasis is placed on creative, artistic and technical achievement.

A portfolio of original work clearly showing the student's present level of accomplishment in all art areas, but more particularly in the area of his selected specialty, should be submitted for faculty evaluation prior to registration for any Art Department course work. A written or verbal report of the evaluation will be given the student with suggested courses of study. Courses required to correct any apparent deficiencies will not necessarily count as graduate credit.

After acceptance to the MFA graduate program and after the completion of one quarter's work, a graduate committee is appointed to aid the student. They assist with the main direction of his work and help in the preparation of the thesis statement, which must be filed with the department and graduate office at the beginning of the second quarter of residence.

A complete written and illustrated record of all graduate work must be kept current for inclusion in a printed thesis. Details of the nature of the thesis or project report may be obtained from the graduate director of the Art Department.

At least one month prior to graduation the student must design a comprehensive exhibit of his graduate work and be responsible for its display. All paintings, drawings, photographs, or prints must be appropriately matted or framed. Sculpture and ceramics must be carefully displayed on suitable stands or tables or in exhibit cases. Suggestions for the exhibit will be made by the student's graduate committee, but the candidate is solely responsible for the design and display of his show, which will be considered an important conclusion to his graduate work. The display area and time will be planned with the help of the graduate director at least three months before exhibition time. All work to be shown in the exhibit must be selected with the help of the graduate committee. Regardless of the number of credits accumulated or courses completed, the degree will be granted only on approval of the graduate committee.

At the discretion of the faculty, work from the master exhibit will be selected for the University permanent collection.

Prior to the final oral examination, an adequate selection of colored 35mm slides of the master exhibit should be presented to the committee chairman. The slides will be retained in the Art Department as a permanent record of the graduate show.

Two quarters of successful work in the graduate seminar, Art 680 and one quarter of Philosophy of Art, 560, are required for all BA and BFA degree candidates.

Because the MFA degree is highly individualized, the student should consult the department for more detailed information on requirements.

All graduate art students are urged to plan for participation in the annual Fine Arts tour to Europe and the Spring Art Quarter in Mexico or Italy. Annual Fall tours to San Francisco to visit the galleries, museums, see Broadway plays, San Francisco opera, and other events are required of all graduate students, unless waived by the graduate director.

Art Courses

Undergraduate

101. (1) Exploring Art. Develops understanding of basic principles underlying the visual

forms of art in everyday life. (3F, W, Sp) **Lindstrom**

102. (5) Beginning Design. Basic art elements with projects largely in two dimensions. Required of Art majors. Prerequisite to Art 125. (3F, W, Sp) **Staff**

103. (6) Intermediate Design. Introductory study of form and spatial relationships. Use of various materials, including plaster, clay, wood and wire. Emphasis on the control of materials to express a particular idea. Prerequisite: Art 102. (3W) **Staff**

105. (40) Essentials in Interior Design. Basic philosophy of interior design both domestic and public. Analysis of art elements and principles of design applied to home planning and furnishing. (3F) **Larson**

110. (50) Studio Practice for Elementary Teachers. For Child Development majors, mothers, kindergarten and first grade teachers. (3W, Sp) **Hyde**

115. (30) Introduction to Ceramics (Hand Building). Techniques of throwing, slab and coil building, carving, pinching. Introduction to the complete ceramic process through the use of films, slides and lectures. Desirable prerequisites: Art 101, 102. (3F, W, Sp) **Staff**

116. (31) Beginning Wheel Throwing. Emphasis on the use of the potter's wheel. Design and experimentation are stressed. Introduction to glazing techniques, kiln stacking and firing. Prerequisite: Art 115. (3F, W, Sp) **Elsner, Lindstrom**

120. (8) Basic Drawing. Introduction to the language of drawing, the graphic elements, the various drawing media, and the creative problems involved. Subject matter ranges from simple forms to complex still lifes. Prerequisite to all painting courses. (3F, W, Sp) **Staff**

121. (9) Anatomy for Artists. Analysis of the principle laws and structure of the human figure through textbook assignments, drawing and three-dimensional clay studies from live models. Prerequisite to Life Drawing. (3W) **Van Suchtelen**

125. (14) Introduction to Painting. Basic approaches to painting which develop freedom of expression and experiences in various applications. Tempera and related media. Required as prerequisite to all other painting courses. Prerequisite: Art 102. (3F, W) **Thorpe**

126. (11) Beginning Watercolor. Experimental approaches with transparent watercolor, casein, gouache. Part of the quarter spent outdoors sketching directly from nature. Prerequisite: Art 120. (3F, Sp) **Lindstrom**

130. (81) Beginning Lettering. Problems in typography indication for advertising layouts. Practical problems in hard setting type, ordering type, and advertising paste-up production. (3W) **Anderson**

131. (82) Beginning Advertising Design. Introduction to the many different kinds of advertising media and techniques. An assignment is met in each media, such as newspaper, magazine, outdoor advertising, trademarks, letterheads, and brochures; an understanding of lettering and type in advertising design. Prerequisites: Art 102, 103, 120, 130, 302. (3F) **Anderson**

132. (new) Commercial Art Seminar. A weekly seminar to discuss and view current art trends in advertising design, photography and illustration. A professional guest artist will lecture and show his work once a month. (1F, W, Sp, Su) **Anderson**

135. (83) Beginning Illustration. All media are explored and problems are solved in a variety of techniques. Drawing from the model and imagination. Prerequisites: Art 102, 120, 121, 122. (3Sp) **Anderson**

140. (57) Photo Fundamentals. Correct camera operation, landscape and simple portrait picture taking, preparation and care of chemical solutions, negative development, contact printing and elementary enlarging. (3F, W, Sp) **Clark**

141. (58) Intermediate Photography. Emphasis on proper exposure, careful composition and the creation of photographic prints, which convey personal feeling. Prerequisite: Art 140. (3F, Sp) **Clark**

142. (59) Photo Lab Techniques. Correct darkroom methods are stressed. A variety of problems in developing and printing. Special negative control methods such as: intensification, reduction, solarization, reticulation, tone line and the positive and negative sandwich. Prerequisites: Art 140, 141. (3W) **Clark**

143. (54) Photo-Lighting. Practical projects are assigned emphasizing floodlighting, flash, strobe and natural lighting. Prerequisites: Art 140, 141. (3F) **Clark**

144. (56) Basic Photo Portraiture. Revealing personality and character. Study of the subject, desirable backgrounds, composition, types of lighting, films, papers and darkroom techniques. Prerequisites: Art 140, 141, 143. (3F) **Clark**

145. (19) Jewelry and Metalsmithing. Introduction to basic non-ferrous metal working techniques, including fabrication and raising and casting. Taught alternate years. Prerequisite: Art 103. (3W) **Staff**

150. (66) Creative Handweaving. Introduction to basic elements and procedures of handweaving, providing a foundation for the creation of original design projects — place mats, robes, shoulder bags, ponchos, yardage, etc. (3-5F, Sp) **Larson**

155. (4) Introduction to Printmaking. Basic techniques of printmaking. Woodcut, serigraph, lithography and intaglio. (3F) **Groutage**

160. (60) Beginning Sculpture. Study of figure structure from the model. Use of clay over wire armature. Analysis of skeletal form and its translation at the surface to sculptural expression. Prerequisite: Art 121 or instructor's consent. (3F, W, Sp) **Elsner**

165. (10) History of Contemporary Painting. A text and other illustrative materials are used to help understand contemporary trends in art. (3F, W, Sp) **Tippetts**

166. (34) Primitive Art. Survey of the native arts of Africa, Australia, and Pacific Islands. (3F, W, Sp) **Staff**

167. (36) Art History (Paleolithic Through Classical). (3F) **Staff**

167. (36) Art History (Medieval Through High Renaissance). (3W) **Staff**

167. (37) Art History (Baroque Through Modern). (3Sp) **Staff**

189. (2) Freshman Seminar. To aid Freshman art students Fall Quarter in University orientation and provide particular orientation within the various areas of the Art Department. Informal group discussions of special related topics of career opportunities, scholarships, etc. Required of all Freshman Art majors. (1F) **Staff**

190. (new) Independent Study. Credit arranged.

240. (170) Photography Laws and Regulations. Lecture course for Photography and Journalism majors and minors, and other students who may use the camera as a reproductive tool. Included are copyright regulations, libel, model release, right of privacy statutes, courtroom regulations and photographic etiquette. (1F) **Hansen**

290. (new) Individual Project. Credit arranged.

302. (7) Advanced Design. Problems in visual communications solved in two and three dimensions. Prerequisite: Art 102. (3Sp) **Staff**

305. (140) Applied Interior Design. Practical application of art elements and principles of design to problems of home decoration and furnishings. Prerequisite: Art 105. (3W) **Larson**

306. (142) Interior Design Studio. Activities such as the designing and construction of two- and three-dimensional models, interiors, elevations and decorative details — traditional and contemporary, public and domestic. Prerequisite: Credit arranged. (W) **Larson**

310. (151) Art Methods for Elementary Grades. Methods of teaching drawing, painting, design, and art history, art appreciation, sculpture, ceramics and handwork in the elementary schools. Required preparation for a grade school teacher. (3F, W, Sp) **Hyde**

312. (152) Art Methods for Secondary Teachers. Methods of teaching art in high school. How to motivate work in drawing, painting, design, sculpture, art history, art appreciation, curriculum development and crafts. Required of all majors and minors in Art on a secondary teaching level. (3F) **Hyde**

315. (130) Ceramic Hand Building Techniques. A production of pottery using techniques such as coils, slabs, pinching, etc. In addition, glazing and decorating will be an important part of the course. Prerequisites: Art 102, 103, 115, 116. (3F, W, Sp) **Elsner, Lindstrom**

320. (13) Drawing and Composition. Intensive drawing in all media emphasizing various approaches to composition. Prerequisites: Art 120, 122. (3W, Sp) **Van Suchtelen**

321. (104) Life Drawing. Drawing from the model, studying the design and structure of the human figure, and the exploration of graphic interpretations. Prerequisites: Art 121, 320. (3F, W, Sp) **Van Suchtelen**

325. (109) Landscape Painting. Various approaches and techniques in landscape painting, in oil and related media. Includes field trips. Prerequisites: Art 120, 125. (3F, Sp) **Thorpe**

326. (111) Watercolor and Related Media. Students may use any aqueous medium or combination. Several lab periods will be spent sketching out of doors. Prerequisite: Art 126. (3F, Sp) **Lindstrom**

330. (181) Advanced lettering. Finished lettering for magazine and newspaper advertisements, packaging and symbols. Prerequisite: Art 130. (3W) **Anderson**

331. (182) Advanced Advertising Design. Theory of designating the complete advertising campaign and corporate image. Training in producing professional advertising for employment in this field. Prerequisite: Art 131. (3F, Sp) **Anderson**

340. (53) Color Photography. Primarily for the Photography major or advanced amateur. Project assignments teach proper exposure of various color films used for projection, print and reproduction purposes. Various filters and lighting techniques are used for correction and creative effects. (3Sp) **Clark**

341. (157) Photography for Publications. Photography for newspaper coverage of news events and sports, and for illustration in other media. Designed to meet specific needs of students who will prepare illustrated articles for publication. Prerequisites: Art 140, 141. (3Sp) **Staff**

345. (119) Metalsmithing. Intermediate problems in forging, raising and fabricating of

non-ferrous metals. Taught alternating years. Prerequisite: Art 145. (3W) **Staff**

350. (66) Intermediate Weaving. Introduces various flat and floss rug weaves, double or Finn weave and patterned weaving through use of overshot techniques. To produce articles of original design using these techniques, such as: rugs, yardage, wall hangings, room dividers, floor pillows, etc. Prerequisite: Art 150. Credit arranged. (F, W, Sp, Su) **Larson**

351. (114) Fabric Design: Dye Techniques. Projects in creating original designs and applying them to suitable fabrics in techniques of color discharge, tye-dye, dough-dye and batik. Desirable prerequisite: Art 102. (3F) **Larson**

352. (115) Fabric Design: Painting Techniques. Projects in creating original designs and applying them to suitable fabrics in techniques of stencil, freehand painting, silk-screen printing, etc. Desirable prerequisite: Art 102. (3W) **Larson**

353. (116) Macrame and Hooking Techniques. Projects in creating striking, original designs and applying them as rugs, floor pillows, two- and three-dimensional hangings, etc., employing "hooking" techniques and macrame. Desirable prerequisites: Art 102, 103. (3F, Sp) **Larson**

354. (118) Creative Stitchery. Experiments with various colored and textured media: fabrics, yarns, threads and novelty materials as a means of creative expression, employing techniques of stitchery with fresh, new design approaches. Prerequisite: Art 102. (3W) **Larson**

360. (160) Intermediate Sculpture Studio. Continued study of the figure and its translation to sculptural expression. Various techniques, including plaster modeling, casting, welding and carving are introduced. A more experimental approach to form is employed. Prerequisite: Art 160. (3F, W, Sp) **Elsner**

365. (38) History of Painting in the United States. (3F) **Lindstrom**

390. (new) Independent Study. Credit arranged.

405. (144) Interior Design Apprenticeship. Designed to acquaint students planning to enter interior designing professionally with actual business procedures as practiced by reputable, well-trained interior designers approved by USU Art staff. Prerequisite: Art 305. (5F, Sp) **Larson**

411. (153) Elementary Workshop. Methods of presenting materials and techniques to the elementary teacher: art history, art appreciation, painting, drawing, sculpture, ceramics, posters, murals, color theory and harmony, weaving, puppets and many other subjects. (3Su) **Hyde**

412. (154) Secondary Workshop. Methods of presenting materials and techniques to the secondary teacher: art history, art appreciation, painting, drawing, sculpture, ceramics, posters, murals, color theory and harmony, weaving, and many other subjects. (3Su) **Hyde**

445. (120) Jewelry Casting. Advanced problems in centrifugal casting, using wax as the creative medium. Continued study of various types of jewelry forms and the techniques necessary for the completion of the non-ferrous metal product. Taught alternate years. Prerequisite: Art 103, 145. (3W) **Staff**

450. (166) Advanced Fabric Design in Weaving. Special projects in applying original designs to creative weaving of tapestries, rugs, yardage and domestic textiles. Prerequisites: Art 102, 150, 350 or equivalent. Credit arranged. (F, W, Sp) **Larson**

490. (new) Individual Projects. (3)

505. (143) Advanced Problems in Interior Design. Experimental projects in home planning and furnishing. Prerequisite: Art 306. Credit arranged. (Sp) **Larson**

514. (156) Student Teaching at University Level. Teaching techniques and procedures for university level. (3F, W, Sp) **Hyde**

515. (132) Advanced Ceramic Studio. Advanced work in area selected with the aid of the major professor. Prerequisites: Art 102, 103, 115, 116, 315, 516. (3F, W, Sp) **Elsner, Lindstrom**

516. (131) Advanced Wheel Throwing. Studio and facilities provided for special projects of the student's own choosing. Technical and innovative research to develop special skills in the use of the potter's wheel will be important. Prerequisites: Art 115, 116. Instructor's consent. Credit arranged. (F, W, Sp, Su) **Elsner, Lindstrom**

521. (105) Advanced Life Drawing. Drawing from the model with concern for the structure of the human figure, but with greater emphasis on compositional and graphic exploration. Prerequisites: Art 121, 320, 321. (3Sp) **Van Suchtelen**

522. (106) Drawing Studio. Advanced individual drawing problems in various media. Prerequisites: Art 321, 521. Credit arranged. (F, W, Sp) **Van Suchtelen**

525. (112) Portrait Painting. Problems of portrait painting with emphasis on the literal representation of form. Various ages and racial types are studied. Prerequisites: Art 120, 125. (3Sp) **Thorpe**

526. (113) Watercolor Studio. Advanced painting problems in watercolor and related media. Prerequisite: Art 326. Credit arranged. (F, Sp) **Lindstrom**

527. (127) Painting Studio. Designed to develop creative ideas through the process of experimentation in various applications in oil and related media. Work may be done in representational or non-representational areas. Prerequisite: Art 125. (3W, Sp) **Thorpe**

530. (184) Commercial Art Studio. Advanced problems in corporate design, packaging, fashion illustration, illustration, and graphic design in two and three dimensions. Prerequisites: Art 131, 135, 302. Credit arranged. (F, W, Sp) **Anderson**

535. (183) Advanced Illustration. Preparation for the specialized field of illustration. Experimentation in different techniques and media to use for different types of reproduction in newspapers or magazines. Involves researching problems and meeting deadlines. Prerequisite: Art 135. (3F, Sp) **Edwards**

540. (128) Photography Studio. Designed to cover several phases of photography with emphasis on composing what we see in an artistic manner. Also, to allow Senior Photo majors and selected junior students to work with more concentration in their major areas. Credit arranged. (F, W, Sp) **Clark**

541. (164) Photo Illustration. Major uses of photography in commercial advertising and illustration. Typical magazine and newspaper assignments on an individual project basis. Imaginative ideas, novel techniques, and sensitive design layouts. May be repeated a maximum of three times for credit. Admission only by permission of the instructor. (5W, Sp) **Clark**

542. (167) Color Printing. Project assignments are given to cover a wide range of subjects under various lighting conditions. Taught alternate years. Prerequisites: Art 140, 141, 340. (3W) **Clark**

543. (165) Advanced Photo Portraitures. Intensive studio work and "on-the-job" portrait assignments to develop insight and photo techniques necessary to produce portraits for commercial studio, advertising, and editorial purposes. Admission only by permission of instructor. (5F, W, Sp) **Clark**

544. (168) Advanced Publications Photography. Actual story assignments that require the preparation of detailed shooting scripts, editorial selection of promising prints, cropping and final presentation of photo stories. Projects vary from single to multiple picture coverage. Admission only by permission of instructor. (5F, W, Sp) **Clark**

545. (121) Jewelry and Metalsmithing Studio. Advanced undergraduate problems in nonferrous metal working techniques, including casting. Taught alternate years. Prerequisite: Art 345. (3W) **Staff**

550. (117) Fabric Design Studio. Advanced individual projects in structural and applied fabric design. Prerequisites: Art 102, 103, 302, 351, 352, 353, 354. Credit arranged. (F, W, Sp) **Larson**

555. (191) Printmaking (Woodcut). The making of prints from designs cut in wood, using from one to many colors. (3F) **Groutage**

555. (192) Printmaking (Serigraph) Techniques in silk screen printing, including glue, tusche glue, cut paper and lacquer film, etc., for the purpose of making multiple original works of art. (3W) **Groutage**

555. (193) Printmaking (Lithography). Producing prints from drawings on limestone. (3Sp) **Groutage**

555. (194) Printmaking (Intaglio). Production of prints from metal plates using various etching and engraving techniques. (3W, Sp, Su) **Groutage**

559. (195) Printmaking Studio. Individual production in prints using any technique. Prerequisite: Three credits of Art 555. Credit arranged. (F, W, Sp, Su) **Groutage**

560. (163) Advanced Sculpture Studio. Advanced problems dealing with the figure and sculptural expression. Introduction to bronze casting. Prerequisites: Art 160, 360. Credit arranged. (F, W, Sp) **Elsner**

565. (101) Contemporary European Arts and Crafts. An art appreciation course devoted to an investigation of current European creative efforts in painting, sculpture, and the varied crafts. Taught only on the Summer Art Tour of Europe. (3Su) **Tippetts**

565. (103) High Renaissance Art. A more specialized Art History class studying the works of Leonardo da Vinci, Michelangelo and Raphael, master painters of the Italian High Renaissance. Taught only on the Summer Art Tour of Europe. (3Su) **Tippetts**

567. (110) Modern European Painting. Investigates some of the major trends in contemporary European painting. Major attention will be devoted to the "School of Paris" and modern Italian painters. Taught only on the Summer Art Tour of Europe. (3Su) **Tippetts**

568. (190) Survey of Mexican Art. A survey course of Mexican art covering colonial and modern architecture and the great Mexican painters, Rivera, Orozco, and Siquerios. Taught only on the Spring Art Program in Mexico. (3Sp) **Staff**

599. (41) Fundamentals of Interior Design. (Off-campus only) (5)

Graduate

605. (243) Problems in Interior Design. Complete presentation of actual or simulated projects in interior designing of domestic or public buildings and research projects in con-

temporary or traditional design media. Prerequisites: Art 306, 505, and graduate status. Credit arranged. (F, W, Sp) **Larson**

615. (232) Ceramic Studio. (Hand Building, Wheel Throw, Glaze and Decoration) Arranged to provide time, equipment and facilities for the graduate student to pursue special studies or projects of his own choosing. Stresses technical or creative aspects of ceramics. Credit arranged. (F, W, Sp, Su) **Elsner, Lindstrom**

620. (206) Drawing Studio. (Theme Project, Applied Project, Media Exploration) Advanced individual drawing projects designed to aid in preparation for the thesis project. Theme project includes a series of drawings dealing with a major literary, social or philosophical theme with extensive research into a particular direction of the graphic projects to aid the student in specific applied areas such as commissions, murals, illustrated books or teaching programs. Media exploration allows the student to fully explore all traditional drawing media and to search for effective usage of "unusual" combinations and means. (F, W, Sp) **Van Suchtelen**

625. (227) Painting Studio. Emphasis on the individual attainment of personal conviction or direction in painting. Prerequisite: Graduate status. Credit arranged. (F, W, Sp) **Staff**

626. (213) Watercolor Studio. All work and projects will be individually planned with the instructor's help. Mainly individual instruction, criticism, and evaluations. Prerequisite: Graduate status. Credit arranged. (F, W, Sp) **Lindstrom**

630. (284) Design Studio. (Advertising, Corporate, Graphic) Advertising problems include illustration, displays, package design, lettering, and projects in second- and third-dimension rendering in a variety of media for the portfolio. Corporate design includes problems in design of trademark, stationery, business form, signage, package design, constitutional advertising, annual report, building and interior applications of logo, and related advertising. Graphic design includes problems in package design, point of purchase display, posters, programs, booklets, record album covers, special promotion pieces, building and interior graphics, and designed lettering. Prerequisite: Graduate status. Credit arranged. (F, W, Sp) **Anderson**

635. (284) Illustration Studio. (Advertising, Editorial, Fashion) Techniques in advertising illustration that meet the needs of a client and his audience. Editorial illustration includes illustrating for children's books, sports, wildlife, and personal (political, social) statements. Fashion illustration is of the male and female figure. Prerequisite: Graduate status. Credit arranged. (F, W, Sp) **Edwards**

640. (228) Photography Studio. Designed to cover several phases of photography with emphasis on composing what we see in an artistic manner. Also, to allow graduate students to further emphasize the area of their chief interest, such as advertising-illustration, industrial, portaiture, etc. Prerequisite: Graduate status. Credit arranged. (F, W, Sp) **Clark**

641. (210) Thesis Photo Problems. Methods of obtaining necessary photographs to supplement thesis study. Information pertaining to the preparation of photos, charts, graphs, etc., for insertion into the final thesis. (1W) **Hansen**

645. (221) Jewelry and Metalsmithing Studio. Graduate problems in jewelry casting and metalsmithing. Credit arranged. (F, W, Sp) **Staff**

650. (217) Advanced Fabric Design Workshop. Advanced projects of original design executed in techniques of applied paints, dyes, etc., to fabric, structural stitchery, or weaving. Prerequisites: Art 351, 352, 353, 354, 450. Credit arranged. (F, W, Sp) **Larson**

655. (295) Printmaking Studio. Intensive individual production in advanced printmaking techniques. Credit arranged. (F, W, Sp) **Groutage**

656. (new) Advanced Problems in Printmaking. Independent exploration in depth of printing techniques. Woodcut, serigraph, lithography or intaglio. Credit arranged. (F, W, Sp) **Groutage**

660. (263) Sculpture Studio. (Modeling, Carving, Welding, Casting) Graduate problems in direct clay and plaster, plaster and resin casting; in stone and wood carving and construction; in gas and electric welding; and in bronze casting. Prerequisite: Graduate status. Credit arranged. (F, W, Sp) **Elsner**

680. (273) Art Seminar. Directed individual study in assigned and elected problems later presented and analyzed at group discussions. Two quarters required of all graduate students. Credit arranged. (F, W, Sp) **Staff**

697. (272) Art Research Thesis Problems. Credit arranged. (F, W, Sp) **Staff**

699. (400) Continuing Graduate Advisement. Variable credit. Taught three quarters. **Staff**

*Department of

Bacteriology, Public Health

Head: Professor Rex S. Spendlove

Office in Plant Industry 309

Professors Lewis W. Jones, Melvin M. Keller, Gary H. Richardson, W. Whitney Smith

Associate Professors Paul B. Carter, Frederick J. Post, John P. Skujins

Assistant Professors Larre N. Egbert, Carl A. Westby

Lecturers Newell G. Daines, Ray N. Malouf

Associate Eunice A. Cronin

Degrees: Bachelor of Science (BS), Master of Science (MS), Doctor of Philosophy (PhD)

Majors: Bacteriology, Public Health, Medical Technology

Bacteriology. The BS, MS and PhD degrees are offered in this area. Many opportunities are available in the field of bacteriology. A bacteriologist may find employment in either private or governmental agencies, industry, business, organizations, laboratories, hospitals, or other institutions. Other possibilities are employment to do research in medicine, food and dairy products manufacturing, public health, and positions as teachers. In addition to the basic degrees in Bacteriology, a graduate major in Microbial Ecology is offered jointly with the Ecology Center. See the Interdepartmental Curriculum in Ecology for program requirements.

Medical Technology. While there have been medical laboratory workers for many years, the profession of Medical Technology is relatively recent.

The Registry of Medical Technologists, working with the American Medical Association, establishes the basic educational requirements. Presently, the requirements are three years of college preparation with a one-year internship, which is accepted as a year of college work. When a student completes this fourth year, he obtains a BS degree and becomes eligible to take the national examination given by the Registry of Medical Technologists.

There is a need for people to prepare for general laboratory work as well as for specialization. Positions are available in hospitals, clinics, industry, public health, teaching, and research.

Public Health. A BS degree in Public Health is offered. Graduates seek employment in business, industry, schools, educational and service organizations, and voluntary or governmental health agencies. Employment opportunities are available as public health educators, sanitarians, nurses, nutritionists, administrators, laboratory specialists, mental health workers, and social workers.

Bacteriology

Bachelor of Science Degree. Preparation for the major should

*In College of Science.

include the following courses: Biology 120, 121, 122; Chemistry 121, 122, 123; Math 105, 106, 220 (or 220, 221, 222); Physics 111, 112, 113. Some of these may be used to fulfill group requirements.

Major. The major requires 44 credits as follows: Biology 512, 527, 584; Bacteriology 301, 502, 503, 507, 499 and nine credits of upper division related work from: Bacteriology-Medical Technology 331; Zoology 551, 555, 557; Botany 512, 513; English 303; Applied Statistics 431, 432, 433; Chemistry 301 (or 306, 307, or 308). Choice of these courses must meet adviser's approval. Also required are Chemistry 331, 332, 360 and 370 which constitutes a minor in Chemistry.

Students who anticipate graduate work should include a year's sequence of a modern language.

Students meeting requirements for the Bachelor of Science degree in Bacteriology by taking Zoology 557 are eligible to apply for admission to dental or medical schools.

A suggested schedule for majors by year is:

FRESHMAN YEAR

Courses	Credits
Chemistry 121, 122, 123	15
Math 105, 106, 220	15
English 101, 102, 103	9
Gen Univ Requirements	9
	48

SOPHOMORE YEAR

Biology 120, 121, 122	15
Chemistry 331, 333	8
Gen Univ Requirements	14
Student Electives	11
	48

JUNIOR YEAR

Biology 527, 584	10
Bacteriology 301, 502, 507	14
Physics 211, 212, 213	15
Chemistry 370	5
	44

SENIOR YEAR

Bacteriology 503, 499	6
Chemistry 360	4
Biology 512	5
Major Electives	9
Student Electives	22
	46

The Department of Bacteriology and Public Health has good facilities for research and advanced studies. It occupies part of the Bacteriology - Veterinary Science Building. Technical instruments include an electron microscope, ultracentrifuge, electrophoresis apparatus, spectrograph, flame spectrophotometer, and other major research instruments.

Master of Science in Bacteriology. (See also Master of Science degree in School of Graduate Studies in this catalog.) The master's degree in Bacteriology combines a substantial research effort with a rounding out of course work in Bacteriology and related subjects. At the conclusion of the master's degree, candidates are expected to have completed those Bacteriology and related courses designated by the candidate's committee.

Doctor of Philosophy in Bacteriology. (See also Doctor of Philosophy degree in School of Graduate Studies section.) The doctorate in Bacteriology is primarily a research degree. A doctoral thesis comprising an intensive and definitive contribution to knowledge is the most basic requirement.

In previous training or in the doctoral program, candidates are expected to complete an extensive selection of courses in Bacterial Physiology, Immunology, Taxonomy, Soil, Dairy, Food, Pathogenic and Aquatic Microbiology, as well as Mycology, Protozoology, and Virology.

Appropriate supporting courses are expected in Biochemistry,

Physical Chemistry, Genetics, Pathology, Entomology, Plant Physiology, Cellular Physiology, and other science specialties.

Candidates are expected to offer certain research tools: Applied Statistics, and a reading knowledge of German, Russian, or French, or a reading knowledge of two foreign languages of scientific significance; or suitable substitutes justified by the nature of the doctoral program.

Bacteriology Courses

Undergraduate

For additional courses in Biology see the Division of Biology in this catalog.

111. (10) Elementary Microbiology. Biology and role of microorganisms in natural processes. Not intended for Biology majors who should take Bact 301. May be used as a prerequisite (together with Bact 112) only for Bact 480, 499, 510, 515, 530, and 560. Four lectures. (4F, W, Sp, Su) **Staff**

112. (10) Elementary Microbiology Laboratory. Nature of microorganisms, media preparation, and laboratory techniques. Accompanies Bact 111 which must be taken as a prerequisite or concurrently. One lab. (1F, W, Sp, Su) **Staff**

301. (70) General Microbiology. Microbes, their ecology, biology, and role in nature. Emphasis on the bacteria. Prerequisites: Biology 120, 121, 122 and Organic Chemistry (may be taken concurrently). Three lectures, two labs. (5F, Sp) **Jones, Post**

480. (172) Microbiology Laboratory Methods. Acquaints the student with media preparation, laboratory supply and administration, and the simple maintenance and repair of common laboratory equipment. Prerequisites: Biology 120, 121, 122 and Bact 111-112 or 301. One lab. (1W, Su) **Staff**

499. (198) Undergraduate Problems Course. Special directed studies on current problems and research in microbiology utilizing the literature, seminar, or laboratory investigation as it suits the student. Prerequisite: Bact 111-112 or 301, or instructor's consent. May be repeated for credit. Credit arranged. (F, W, Sp, Su) **Staff**

502. (160) Pathogenic Microbiology. Properties of pathogens and their relationships to infectious diseases. Prerequisites: Bact 301 or instructor's consent. Three lectures, two labs. (5F) **Carter**

503. (168) Immunology. The immune response in the host animal and serological procedures. Prerequisites: Organic Chemistry and Bact 301 or Physiology 502. Three lectures, two labs. (5W) **Staff**

507. (180) Microbial Physiology. Physiology and metabolism of microorganisms including growth, permeability, respiration, and fermentation. Prerequisite: Bact 301. Recommended: Chemistry 370 or equivalent. Three lectures, one lab. (4Sp) **Westby**

510. (120) Food Microbiology. Relationship of microorganisms to food preservation, spoilage and poisoning. Prerequisite: Bact 111-112 or 301 or instructor's consent. Two lectures. (2W) **Post**

511. (121) Food Microbiology Laboratory. Previous or concurrent enrollment in Bact 510. Two labs. (2W) **Post**

515. (104) Dairy Microbiology Laboratory. Microorganisms of milk and its products. Prerequisite: Bact 111-112, or 301. Two lectures. (2F) **Richardson**

516. (105) Dairy Microbiology Laboratory. Prerequisite: Previous or concurrent enrollment in Bact 515. One lab. (1F) **Richardson**

530. (110) Soil Microbiology. Activities and ecology of microorganisms related to soil properties, soil fertility, soil organic matter, and the rhizosphere. Prerequisites: Biology 120, 122; Chemistry 332, 360; or instructor's consent. Two lectures, two labs. (4F) **Skujins**

560. (192) Aquatic Microbiology. Principles of microbiology relevant to the aquatic environment. Emphasis on fresh water and waste water. Prerequisites: Bact 111-112, or 301; or Civil Engineering 561 and Wildlife Resources 360-361. Three lectures, one lab. (4Sp) **Post**

570. (170) Virology. Viruses including considerations of chemical, physical and hereditary characteristics; pathogenesis; immunity; virus-host relationships. Prerequisite: Immunology or instructor's consent. Three lectures, two labs. (5W) **Spendlove**

590. (173) Current Microbiology Laboratory Methods. Two labs. (2Sp, Su) **Staff**

Graduate

For additional courses in Biology see the Division of Biology in this catalog.

***611. (201) Bacterial Taxonomy.** Principles of classification; phylogeny and evolution; identification and taxonomic considerations by the use of numerical taxonomic methods. Recommended prerequisite: a course in computer

programming. Two lectures, two labs. (4F of odd years) **Post**

612. (161) Advanced Pathogenic. Parasitism, the host relationship to the disease process and dissemination and control of microbial diseases. Pathogenic fungi, spirochetes and rickettsia. Prerequisite: Instructor's consent. (5Sp) **Carter**

617. (285) Microbial Biosynthesis. Designed to provide the Biology-oriented student with an understanding on the molecular level of certain important metabolic events and their regulation in microorganisms. Included are the biosynthesis and regulation of selected metabolic intermediates (e.g., nucleotides) and end products as well as pertinent genetic aspects of the organisms concerned. Prerequisites: Biochemistry and Biology 512 or equivalents. (3W) **Westby**

630. (210) Advanced Soil Biochemistry and Microbiology. Origin and properties of soil organic matter, fate of agricultural chemicals in soil, and the microbial activities at soil interfaces and in the rhizosphere and rhizoplane. Prerequisite: Bact 530 or instructor's consent. Two lectures. (2W) **Skujins**

***655. (new) Genetics of Lower Organisms.** Concepts of genetic structure, function and recombination in lower organisms with emphasis on current literature. Prerequisite: Biology 512. Three lectures. (3Sp) **Westby, Simmons**

697. (299) Thesis Research. MS. Credit arranged. (F, W, Sp, Su) **Staff**

698. (299) Research Consultation. MS. Credit arranged. (F, W, Sp, Su) **Staff**

699. (299) Continuing Registration. MS. Credit arranged. (F, W, Sp, Su) **Staff**

770. (294) Special Problems in Bacteriology. Prerequisite: Instructor's consent. Credit arranged. (F, W, Sp, Su). **Staff**

780. (291) Seminar. (1F, W, Sp) **Staff**

797. (400) Thesis Research. PhD. Credit arranged. (F, W, Sp, Su) **Staff**

798. (400) Research Consultation. Ph.D. Credit arranged. (F, W, Sp, Su) **Staff**

799. (400) Continuing Registration. Ph.D. Credit arranged. (F, W, Sp, Su) **Staff**

Public Health

Bachelor of Science in Public Health. Preparation for the major should include the following courses: Biology 120, 121, 122; Physics 120; Economics 200; Psychology 101; Sociology 101; Chemistry 111, 112, 141; Math 105, 106; and Bacteriology 301.

A student may major in one of two options: Health Education or Environmental Health. Students in the latter option, with appropriate choice of courses may also meet civil service requirements for microbiologist.

Health Education Option. See W. Whitney Smith, Bacteriology, or Janice Pearce, Physical Education, regarding required courses.

Environmental Health Option requires Geology 111; Public Health 410, 499; Bacteriology 502, 510-511, 515-516, 560; Psychology 351; Landscape Architecture 570; Political Science 561; Entomology 535; Applied Statistics 351 or 431; and 21 credits selected with the approval of the adviser from the areas of Food Science, Water, Recreation and Conservation, or Social Sciences and Administration. A listing of these courses may be obtained from the adviser. An additional 36 credits is available for electives.

For a minor in Health Education, a student should take Public Health 115, 410; HPER 430; Food and Nutrition 122 or 440; and Psychology 270.

Public Health Courses

115. (15) Personal Health. Health problems of university students; especially for Freshmen and Sophomores. (2W) **Malouf**

410. (150) Environmental Health. Consideration of environmental health problems and programs designed to protect man's health. Includes factors of the environment such as water, waste, and refuse disposal, air-borne disease, air pollution, insect and rodent control, noise, industrial hygiene, and radiation protection. Four lectures. (4Sp) **Post**

451. (151) Public and School Health Administration. Organization, administration, and functions of health agencies. (3W) **Staff**

452. (152) Family Health. Fundamentals of healthful living. Open to all upper division students; especially for Juniors who are required to take a course in family health for

*Taught 1971-72.

State of Utah certification. Does not meet the school health requirement for State of Utah certification. (3F) **Daines**

454. (154) School Health for Elementary Teachers. Health problems of students in elementary schools. Preschool health testing. Healthful school environment and program. School health laws and practices, health instruction in elementary schools. (3F, W, Sp, Su) **Smith**

455. (155) School Health for Secondary Teachers. Health problems of students in secondary schools. Healthful school environment and program. School health laws and practices. (3F, W, Sp, Su) **Smith**

456. (156) School Health for Health Teachers. Content of the secondary school health courses. Health problems of secondary students. Healthful school environment and program. School health laws and practices. (3F, W, Sp) **Pearce**

480. (159) Public Health Laboratory Methods. Experience in the practice of the public health laboratory. (3-15 F, W, Sp, Su) **Fraser**

499. (199) Special Problems in Public Health. Credit arranged. (F, W, Sp, Su) **Staff**

580. (149) Seminar in Health Problems. (2W) **Smith**

670. (254) Special Problems in Public Health. Credit arranged. (F, W, Sp, Su) **Staff**

Medical Technology

The College of Science offers courses which satisfy entrance requirements for Medical Technology internships in the United States and Canada. The University provides a three-year program which, combined with the internship, qualifies the student for the BS degree.

A Medical Technology major should take during the first three years: Bacteriology 301, 502, 503; Medical Technology 331; Biology 120, 121, 122; Chemistry 121, 122, 123, 331, 332, or 360, 370; Physiology 130; Physics 120; Zoology 555. A hospital internship for 12 months is completed during the fourth year. This includes instruction in Medical Technology 490, 491, 492, 493, 494. This internship is available in the LDS hospitals of Salt Lake City, Ogden, and Idaho Falls, and at St. Benedict's hospital in Ogden. During this fourth year, students register for three quarters (45 upper division credits in Medical Technology). When this program is satisfactorily completed, a student is eligible for the Bachelor of Science degree in Medical Technology. A student may then also apply for certification by the Registry of Medical Technologists, after completion of a qualifying examination given by the American Society of Clinical Pathologists. Consult Professor Paul B. Carter for further details.

Medical Technology Courses

331. (131) Clinical Laboratory Methods. Emphasis is placed on the performance of tests and collection of data that can be utilized by the physician in the diagnosis of disease. Prerequisite: Bact 301. (4Sp) **Carter**

490, 491, 492. (133, 134, 135) Applied Medical Technology. Practical work in hospital laboratories under close supervision: clinical bacteriology and serology, two months; clinical biochemistry, three months; clinical hematology, one month; pathological tissue methods, two months; blood bank procedures, two months; electrocardiograph and basal metabolism procedures. (13F, W, Sp) **Carter**

493.(136) General Pathology Discussions. (2F) **Carter**

494. (137) Clinical Laboratory Methods Discussion. (2W) **Carter**

495. (138) Blood Bank and Blood Serology Techniques. (1Sp) **Carter**

496. (139) Pathological Conference. (1Sp) **Carter**

*Division of

Biochemistry

Chairman: Associate Professor Bruce F. Burnham

Office in Maeser Laboratory 106A

Professors Thomas F. Emery, R. Gaurth Hansen, Ralph M. Johnson, Joseph C. Street

Associate Professors LeGrande C. Ellis, John R. Simmons

Assistant Professors Larre N. Egbert, Thomas M. Farley, Carl A. Westby

Undergraduate Study

An undergraduate major in Biochemistry is not offered. Those individuals considering graduate study in Biochemistry are advised to pursue a major in Chemistry while including as many electives in Biology as possible.

Graduate Study

Admission Procedure and Standards. A student must first be accepted by the School of Graduate Studies. To be admitted for graduate study a student must have a bachelor's degree from a recognized institution. A grade of "B" in undergraduate science courses is the minimum acceptable scholastic performance. The student should, as an undergraduate, have completed one-year sequences in General, Organic, and Physical Chemistry; Mathematics through Calculus; General Physics; and the equivalent of one year in the biological sciences, e.g. Zoology, Botany, Genetics, Microbiology. If the student lacks any of these courses, or if his knowledge in these subjects is insufficient (determined by examination upon entrance), the deficiencies must be immediately removed by taking the appropriate undergraduate courses without graduate credit.

Entrance Examinations. Each student who is admitted to graduate study without restriction must take two examinations: 1) the Graduate Record Examination including the advanced test in Biology administered by the Graduate School, and 2) an Entrance Examination administered by the Chemistry Department in two fields of Chemistry (Organic and Physical) at the Bachelor of Science level.

Master of Science Degree. The Biochemistry Division of the Department of Chemistry offers advanced study and research leading to the degree Master of Science in Biochemistry. Before completion of this degree, the student must fulfill the following requirements: 1) make up any deficiencies revealed by the entrance examinations; 2) meet course credit requirements for the MS degree outlined by the School of Graduate Studies; 3) conduct research and write a thesis that is acceptable by the student's supervisory committee; 4) pass a final oral examination which will consist primarily of a defense of the research and thesis.

Doctor of Philosophy Degree. The Biochemistry Division of the

*In College of Science.

Department of Chemistry offers advanced study and research leading to the degree of Doctor of Philosophy in Biochemistry. Before admission to candidacy, the student must fulfill the following requirements: 1) make up any deficiencies revealed by the entrance examinations; 2) pass a language examination, administered by the Graduate School in either German, French, or Russian; 3) pass a comprehensive examination, written and oral, in Biochemistry; this must be done no later than one academic year before the final examination on the thesis; 4) present a statement of the thesis problem that is acceptable to the student's supervisory committee.

Biochemistry Courses

Elementary Biochemistry. A brief survey of the chemistry of biologically important compounds such as carbohydrates, lipids, proteins, nucleic acids and enzymes, including their role in animal and plant metabolism. Qualitative and semi-quantitative experiments are performed in the laboratory. This is a terminal course normally not intended to meet requirements for more advanced work in Biochemistry. (See Chem 370.)

Principles of Biochemistry. The chemical and physical behavior of biologically important compounds. Bioenergetics and enzyme chemistry are included. (See Chem 670.)

Principles of Biochemistry. Covers intermediary metabolism, oxidation-reduction, photosynthesis and nitrogen fixation. Organic mechanisms pertaining to these areas of metabolism are discussed. (See Chem 671.)

Principles of Biochemistry. Biosynthesis and metabolism of biologically important compounds. Includes nucleic acids and protein biosynthesis, regulatory mechanisms and genetics. (See Chem 672.)

Biochemistry Laboratory. Laboratory experiments illustrating general principles in studying biological materials. (See Chem 673-674.)

Enzymes. Structure, function and mechanism of enzymes from plant and animal sources. (See Chem 775.)

Enzyme Chemistry Laboratory. Experimental methods of enzymology, including purification, characterization, assay techniques and kinetic studies. (See Chem 776.)

Nucleic Acids and Proteins. Physical chemistry of macromolecules. Structure as related to function of nucleic acids, proteins and viruses. (See Chem 676.)

Advanced Biochemical Research Techniques. Modern experimental techniques of biochemical research. (See Chem 675.)

Special Topics in Biochemistry. Lectures and discussion on selected advanced level topics. Emphasis on recent developments in specialized areas. (See Chem 780.)

Biochemical Genetics. Concepts of genetic function at the molecular level with emphasis on current literature. (See Zool 657.)

Microbial Biosynthesis. Amino acid, purine and pyrimidine nucleotide biosynthesis and regulation; molecular action of antibiotics. (See Bact 617.)

*Division of

Biology

Acting Director: Professor Keith L. Dixon
Office in Forestry-Zoology 127
Professors Frank T. Salisbury, Raymond T. Sanders, Richard J. Shaw
Associate Professors James T. Bowman, Gene H. Linford, Ivan G. Palmblad, John R. Simmons, Hugh P. Stanley
Assistant Professors Larre N. Egbert, James A. Gessaman, Raymond I. Lynn

The Division of Biology has the responsibility for developing and teaching courses and curricula that do not clearly fall within the scope of specific concern of either the Department of Bacteriology and Public Health, Department of Botany, or Department of Zoology. For information relative to the programs of these departments, the student is referred to the appropriate departmental sections of this catalog.

The programs of the Division of Biology do not, by themselves, lead to a baccalaureate degree. It is strongly recommended, however, that the core courses, including Biology 120, 121, 122, 512, 527, and 584, be taken by students majoring in either Bacteriology, Botany, or Zoology. Students majoring in one of these departments must have their programs approved by the department concerned, and meet the graduation requirements prescribed by the department.

For additional courses in Biology, see sections under the Departments of Bacteriology and Public Health, Botany, and Zoology.

*In College of Science.

Biology Courses

101. (1) Principles of Biology. Basic life principles as illustrated in animals, plants, and microbes. Four lectures, one recitation, and one two-hour lab. (5F, W, Sp, Su)
Linford, Lynn, Palmblad, Salisbury

120. (20) General Biology. An introduction to the principles of biology, the diversity of life, adaptation, form and function among seed plants and vertebrates. Three lectures, two laboratories. (5F) **Dixon, Shaw**

121. (21) General Biology. Chemical basis of life, cellular basis of life, cellular and subcellular structure and function, introduction to Mendellian genetics, developmental biology. Four lectures, one lab. (5W) **Staff**

122. (22) General Biology. An introduction to the principles of evolution, population genetics, plants and vertebrates. Four lectures, one laboratory. (5Sp)
Bowman, Dixon, Gessaman

308. (100) Evolution, Ecology, and Man. Inspection of selected biological phenomena with emphasis on their social implications. Basic evolutionary and ecological principles are presented to provide insight to students concerned with the fate of the human ecosystem. Prerequisites: Biology 101 or Biology 122 and upper division standing. Introductory Psychology, Anthropology, and Sociology are recommended. Three lectures, one conference. (4W, Sp) **Palmblad**

508. (190) Analytical Methods in Biology. An introduction to the analytical methods that are used in modern experimental biology. 1 lecture, 2 laboratories. Prerequisites: Biology 512, 527 and organic chemistry. (3Sp) **Egbert**

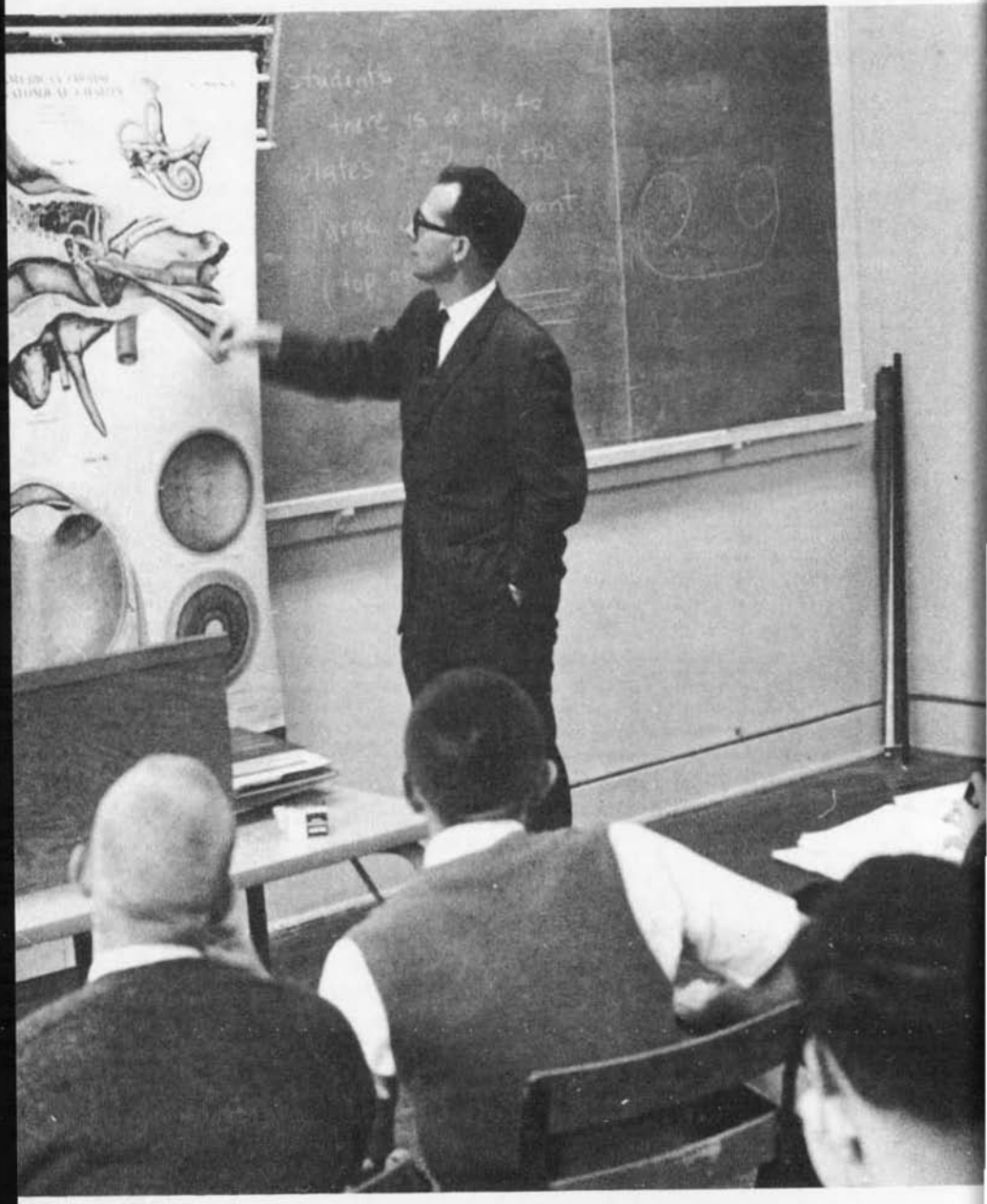
512. (112) Principles of Genetics. Illustrative material is taken from animals, plants, and man. Prerequisities. Biology 122, or equivalent, plus one quarter of Algebra. Four lectures, one lab. (5F, W) **Staff**

527. (127) Cell Biology. Study of cells, structure, functions, organization. Deals with microorganisms, plant, and animal cells. Three lectures, two labs. Prerequisite: Biology 512, Chemistry 533. (5W) **Staff**

584. (184) General Ecology. Interrelationships and adaptations of individual organisms and populations to their environment; ecosystem function, and stability; productivity and perturbation of seral and mature ecosystems. Prerequisites: Biology 101 or Biology 122 (or equivalent). (5F, Sp, Su) **Staff**

585. (185) General Ecology Laboratory. Sampling theory and methods in ecology, characteristics of aquatic, montane, and desert ecosystems. Prerequisite: Biology 584 (or take concurrently). (1F, Sp, Su) **Staff**

645. Graduate Seminar in Biology Teaching. (1Sp) **Staff**



*Department of

Botany

Head: Professor Orson S. Cannon

Office in Plant Industry 204

Professors W. S. Boyle, George W. Cochran, David W. Goodall, Arthur H. Holmgren, Frank B. Salisbury, Richard J. Shaw, Herman H. Wiebe

Associate Professors Ivan G. Palmblad, George W. Welkie

Assistant Professor Raymond I. Lynn

Research Associate John L. Chidester

Collaborators: Professor Bryce N. Wadley; **Associate Professors** Eugene H. Cronin, Gerald D. Griffin, Walter T. McDonough, David Mumford, M. Coburn Williams; **Rank not yet assigned** Robert Parker, David L. Nelsen, George Schier

Degrees: Bachelor of Science (BS), Master of Science (MS), Doctor of Philosophy (PhD)

Majors: Plant Pathology, Plant Physiology, Plant Ecology, Taxonomy, Virology, Cytogenetics

The Department of Botany provides a foundation for all Plant Science fields. Its graduates obtain positions in applied fields, as agricultural extension agents, field men, farm managers, laboratory technicians, park naturalists and rangers. Additional opportunities become available to those with the MS or PhD degrees. Students whose undergraduate grades average "B" or better usually can secure fellowships or assistantships that will finance their graduate work.

Majors in Botany obtain training in applied statistics, bacteriology, chemistry, mathematics, physics, and zoology as well as in botany. Specialization usually follows the BS degree.

Plant Taxonomy. The Intermountain Herbarium contains over 130,000 plant specimens and also has the most complete taxonomic library in the intermountain region. The herbarium is in constant use by students and faculty of many departments.

Plant Physiology, Plant Nutrition, and Biochemistry. Outstanding research and teaching are conducted in Plant Physiology, Plant Nutrition, and Biochemistry.

Plant Cytogenetics. Current fields of investigation are: cytogenetic effects of X-irradiation; cytogenetics of polyploids and hybrids; experimental evolution.

Plant Ecology. Evolutionary ecology and algal ecology are represented. In addition the Botany Department is one of seven departments which have pooled their ecological resources in the Ecology Center.

Current projects include germination studies of plant population, plant competition, plant-herbivore interactions, ecological investigations of poisonous plants, and ecology of stream pollution.

*In College of Science.

Plant Pathology and Virology. Diseases often cause heavy plant losses. Research in the Botany Department has led to practices through which diseases are prevented. Basic research at USU on virus diseases of plants has resulted in contributions that have brought world-wide recognition to the Botany Department.

Current projects include: plant disease survey, breeding tomatoes for resistance to curly top and wilt, the nature and behavior of stone and pome fruit viruses, spectral analysis of plant virus infection processes, and virus and virus-like diseases of stone and pome fruits.

Undergraduate Study

Education for future professional work in Botany is the primary objective of the Botany curriculum. Students should have thorough undergraduate training in botany, supported by chemistry, mathematics, physics, and related biological sciences. If graduate study beyond the Master of Science degree is planned, a reading knowledge of at least one foreign language should be acquired. Employment is found in universities and colleges, the U.S. Department of Agriculture, state agricultural experiment stations, and in industry. This curriculum also provides excellent training for students who desire to become teachers of biological sciences in high schools and colleges.

In addition to the general University group requirements for the BS degree in the Humanities and Social and Behavioral Sciences students should take Biology 120, 121, 122, 512, 527, 584, 585 (exceptions to this must be considered on an individual basis); Botany 140, 490, plus 10 additional hours of botany; Chemistry 121, 122, 123, 331, 332; Math 105, 106.

To supplement the foregoing courses, students with their adviser should select additional courses from the following recommended courses for fields of specialization.

Cytogenetics: Botany 618, 512; Plant Science 570; Applied Statistics 431, 432, 433.

Ecology: See the Ecology curriculum requirements as listed under the Interdepartmental Curriculum in Ecology.

Plant Pathology and Virology: Botany 440, 501, 511, 512, 550, 551; Applied Statistics 431, 432, 433; Entomology 539; Plant Science 565; Math 220, 221, 222, 223; Physics 111, 112, 113.

Plant Physiology: Botany 440, 510; Chemistry 360; Math 220, 221, 222, 223; Physics 111, 112, 113.

Taxonomy: Botany 420, 510, 511, 512, 521, 532, 550; Soils 358; Zoology 571.

Graduate Study

Master of Science Degree. The Department of Botany offers the Master of Science degree in the following specialized fields: Cytogenetics, Plant Pathology, Plant Physiology, Plant Ecology, Taxonomy, Virology. Graduate studies are also offered in the Interdepartmental Curriculum in Plant Nutrition and Biochemistry. The opportunities and facilities for research in these fields are greatly augmented through the cooperation of the USU Agricultural Experiment Station, U.S. Agricultural Experiment Station, U.S. Department of Agriculture, and the Intermountain Herbarium.

In most cases a candidate must submit a thesis on a topic within

the field of his major subject; however, with the approval of the major professor, the thesis alternate (Plan B) may be substituted for the thesis if the candidate's primary aim is preparation for teaching with the master's degree.

Doctor of Philosophy Degree. The Department of Botany, in cooperation with related departments, offers the PhD degree in the specialized fields of Plant Pathology, Plant Physiology, Plant Ecology, Taxonomy and Virology. Detailed information may be obtained from the department.

Botany Courses

For additional courses see the Division of Biology.

110. (26) Elementary Botany. A survey of the plant kingdom. Emphasis on comparative morphology, reproductive processes and evolution of representatives of the major groups of plants. Seed plants receive special attention as to form and function. Prerequisite: Biology 120 or equivalent. Three lectures, two labs. (5W, Sp, Su) **Shaw**

420. (102) Taxonomy of Vascular Plants. Kinds, relationships, and classifications of vascular plants, chiefly of this region. Assumes a knowledge of fundamental principles of botany. Three lectures, two labs. (5Sp, Su) **Holmgren, Shaw**

440. (120) Elementary Plant Physiology. Includes water relations, synthesis and use of foods, and growth phenomena. Prerequisites: Biology 120, 121; Chemistry 141 or take concurrently. Four lectures, one lab. (5W, Sp) **Welkie, Wiebe**

490. (new) Undergraduate Seminar. (1F) **Staff**

501. (116) Microtechnique. Principles and methods in preparation of plant materials for microscopic study; efficient use of the microscope. Assumes a knowledge of fundamental principles of botany. Three lectures, two labs. (5W) **Boyle**

510. (117) Anatomy. Structure and development of major cell types and tissues; comparative anatomy of the stem, root, and leaf of seed-bearing plants. Assumes a knowledge of fundamental principles of botany. Three lectures, two labs. (5F) **Boyle**

****511. (125) Morphology of Vascular Plants.** Structure, development, reproduction, and evolution of the classes and orders of vascular plants. Prerequisites: Bot 110 and 420, or instructor's consent. Three lectures, two labs. (5F) **Shaw**

512. (150) Mycology. Comparative morphology and nuclear behavior of the fungi. Special attention given to forms important in agriculture, medicine, and industry. Assumes a knowledge of botany fundamentals. Three lectures, two labs. (5F) **Staff**

513. (160) Fresh-Water Algae. Morphology and identification of fresh-water algae, with special emphasis to be given to the identification of local materials. Two lectures, two labs. (4Sp) **Lynn**

521. (106) Taxonomy of Wildland Plants. A taxonomic and ecological study of common and important vascular plants of the United States. Assumes a knowledge of the fundamental principles of botany. Three lectures, two labs. (5F) **Holmgren**

***532. (104) Evolution of Cultivated Plants.** Origin, evolution and distribution of certain selected plants which are of economic importance to man. Prerequisites: Bot 110, 420; Biology 512, or equivalent. Lectures, readings and student reports. (3F) **Shaw**

550. (130) Principles of Plant Pathology. Fundamental principles underlying disease in plants. Assumes a knowledge of botany fundamentals. Three lectures, two labs. (5F) **Cannon**

****551. (140) Forest Pathology.** Nature, cause and control of diseases affecting forest trees. Assumes a knowledge of botany fundamentals. Three lectures, one lab. (4W) **Cannon**

589. (new) Science Colloquium. (1Su) **Staff**

618. (118) Cytogenetics. A laboratory-discussion course involving intensive study of mitosis, meiosis, and the principal types of chromosomal aberrations. Assumes a knowledge of fundamental principles of biology. Two labs, one discussion period. (3Sp) **Boyle**

****621. (212) Advanced Plant Taxonomy.** Traditional and recent techniques of collecting and synthesizing taxonomic data. Emphasis will be placed on evolution of taxa. Prerequisite: Bot 420. Three lectures, one lab. (4Sp) **Holmgren, Shaw**

630. (200) Evolutionary Ecology. Prerequisites: Biology 584; Genetics and Mechanics of Evolution suggested. Two lectures, one conference. (3F) **Palmblad**

631. (210) Plant Geography. The natural vegetation of the earth with reference to geological history, present distribution and evolution. Prerequisites: Bot 420 and Biology 384. (3Sp) **Shaw**

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*Taught 1971-72.
**Taught 1972-73.

**636. (255) Ecology of Soil Fungi. (4) Staff

**637. (256) Ecology of Aquatic Fungi. (2) Staff

641. (121) Water Relations of Plants. Factors affecting the availability of water, its absorption and use in plants, and the effects of water deficits on plant processes. Prerequisite: Bot 440. (3W) Wiebe

642. (224) Plant Growth and Development. Growth processes, with emphasis on hormones, photoperiod, dormancy. Prerequisite: Bot 440. (3Sp) Wiebe

643. (225) Mineral Nutrition of Plants. Physiological and biochemical processes involved in the mineral nutrition of higher plants. Consideration will be given to specific roles of each nutrient in plant growth and metabolism. Prerequisite: Bot 440. Three lectures, one lab. (4F) Welkie

**644. (226) Plant Virology. Physical and chemical properties of viruses and their biological relationships. Prerequisite: Bot 440. Three lectures, two labs. (5Sp) Welkie

**645. (227) Plant Respiration and Metabolism. The oxidative breakdown of certain organic substances normally present in plant cells. Mechanisms by which sugars are respired to CO_2 and H_2O and the interrelationships between this process and various others. Prerequisite: Bot 440. Three lectures, one lab. (4Sp) Staff

**646. (228) Photosynthesis in Higher Plants. Elucidation of the chloroplast structure and the various mechanisms of photosynthesis; photolysis, electron transfer, chlorophyll excitation, photosynthetic phosphorylation, carbon dioxoide fixation, and the influence of environmental factors on photosynthesis. Prerequisite: Consult instructor. Three lectures, one lab. (4Sp) Staff

**651. (230) Field Plant Pathology. Plant diseases as they occur in Utah. Includes the identification of diseases, conditions leading to their development, and the formulation of practices leading to their control. Field trips and laboratories. Prerequisite: Bot 550 and instructor's consent. (3Su) Cannon

685. (234) Special Problems. Individual instruction. Credit arranged. (F, W, Sp, Su) Staff

690. (240) Seminar. (1F, W) Staff

691. (241) Plant Physiology Seminar. (1W) Staff

692. (new) Plant Pathology Seminar. (1W) Staff

697. (new) Thesis Research. Research in plant cytology, ecology, pathology, physiology, or taxonomy. Individual instruction. Credit arranged. (F, W, Sp, Su) Staff

699. (new) Continuing Graduate Advisement. Credit arranged. (F, W, Sp, Su) Staff

797. (250) Dissertation Research. Research in plant ecology, pathology, physiology, or taxonomy. Individual instruction. Credit arranged. (F, W, Sp, Su) Staff

799. (400) Continuing Graduate Advisement. Credit arranged. (F, W, Sp, Su) Staff

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**Taught 1972-73

*Department of

Business Administration

Acting Head: Associate Professor Eugene C. Kartchner

Office in Business 811

Professor Robert P. Collier

Associate Professors Vernon M. Buehler, Howard M. Carlisle, John R. Cragun, David R. Daines,[1] Calvin D. Lowe, Glenn F. Marston

Assistant Professors Serge Benson, Myron L. Dickey, Allen D. Kartchner, Joseph K. Papenfuss, Paul A. Randle, Krishna Shetty, Lawrence C. Taylor, A. Robert Thurman, Gar Walton, Terrell Williams

Degrees: Bachelor of Arts (BA), Bachelor of Science (BS), Master of Business Administration (MBA)

Majors: Finance, Marketing, Personnel and Industrial Relations, Production Management

The purpose of the Business Administration program is to prepare men and women for administrative positions in business, government and other institutions. Specialized training is provided within specific functional fields of business, as well as training directed at understanding the broader aspects of business as it functions within our free enterprise environment.

Training is specifically provided in four areas:

1) Finance leading to careers in banking, brokerage activities and investments, and positions as financial analysts in industrial corporations.

2) Marketing involving positions in sales, advertising, retailing, traffic and transportation, and other similar activities.

3) Personnel and industrial relations related to the personnel functions of recruitment, wage and salary administration, training, collective bargaining, and labor relations.

4) Production management leading to employment as a foreman on a production line or in one of the production activities such as scheduling, procurement, time and motion studies, quality control, or inventory control.

Placement Services. Each year over a hundred organizations from business, government and education contact the University Placement Services to interview applicants for a wide variety of positions.

Management Institute. In response to the educational needs of business and industry, the Management Institute of the College of Business offers a variety of seminars, workshops, and conferences throughout the year. These are all non-credit offerings and cover such materials as the management of small business, executive development, decision making, human relations in administration, middle-management concepts, etc.

For further information about the services provided through the Management Institute, contact Director Calvin D. Lowe, Business 408-414, or phone Ext. 7377.

*In College of Business.

[1]On leave.

Undergraduate Study

Lower Division. The basic objective of the lower division program in the Department of Business Administration is to provide a broad and sound educational foundation upon which to build a specialized education relating to business.

The following program is required for Business majors during the first two years:

FRESHMAN YEAR

Courses	Credits
English 101, 102, 103	9
Natural Science	18
Math 105, 241	8
Biological Science	5
Physical Science	5
PE, MS, or AS	3
Political Science 110	5
Sociology 101, Psychology 101 or Electives	10
Computer Science 150	3
Total	48

SOPHOMORE YEAR

Accounting 201, 202, 203	9
Business Administration 201, 202, 203 (or 301, 302, 303)	6
Economics 200, 201	10
Humanities	10
Math 242	5
Electives	8
Total	48

This program for the first two years includes few business courses and stresses general education in the social sciences, the natural sciences, and the humanities. It fills the lower division group requirements established by the University.

Upper Division. The objective of the upper division program is to provide sufficient specialized business training to prepare the student to successfully enter the business world in his chosen functional field. The program is also directed at providing the type of general business education that develops the attitudes and analytical ability required for future professional advancement.

During the Junior year the objective is to provide a broad background within business by requiring that courses be taken in all of the key functional areas. The required core courses are as follows:

Courses	Credits
BA 506, 507 Business Statistics	6
BA 511 Management Concepts	4
BA 515 Managerial Accounting	5
BA 540 Corporation Finance	5
BA 550 Fundamentals of Marketing	5
BA 560 Personnel Administration	5
BA 570 Production	5
Econ 500 Income Theory	4
Econ 501 Price Theory	4
BE 351 Business Communications	3
Total	46

One additional core course is required. This is BA 489, Business Policy. However, this is a capstone course and should not be taken until the Senior year.

The Senior year is devoted to obtaining specialization within one of four functional fields of business training.

Finance Major. Finance deals with development of means by which financial resources may be allocated efficiently in our economy on both the micro and macro levels. In addition to the basic core requirements, students majoring in Finance must take the following courses in either their Junior or Senior years: Economics 560, BA 446; Computer Science 350 or Computer Science 380; two courses from Economics 550, BA 441, 448, 509; and one course from BA 321, 424, Accounting 431, 541. In the Senior year the Finance major must take BA 449. In addition to the required courses, it is strongly recommended that the Finance major take additional work in Mathematics, Applied Statistics, Computer Science, and Accounting.

Marketing Major. Modern marketing consists of a total system of interesting business activities designed to plan, price, promote, and distribute want-satisfying goods and services to society. The entire system of business action is becoming more and more market- or consumer-oriented, thereby greatly increasing the demand for graduates with training in Marketing. The following courses are designed to prepare students for careers in all areas of Marketing and must be taken in addition to the basic core: Junior year: BA 451, 452, and 453; Senior year: three courses from BA 454, 455, 456, 457 and 458; and BA 459.

Personnel and Industrial Relations Major. All business operations depend upon manpower; its effective coordination is essential to the success of the enterprise. If students are particularly interested in the recruiting, testing, training, motivation, labor and human relations aspects of management, they should take the following courses in addition to the basic core: Junior year: Economics 520, 521, 523; Psychology 555. Senior year: BA 461, 463, 469 and Sociology 550 or 532 is recommended.

Production Management Major. Production activity gives shape to a firm's physical products; production management involves the planning, directing, and controlling of activities related to production. Typical starting jobs for graduates are in procurement and materials control, production planning and control, quality control, cost control, and first line supervision. In addition to the basic core, required courses are: Junior year: Manufacturing Engineering 450; Computer Science 380 or 350; Industrial and Technical Education 151, and BA 509. Senior year: BA 472, Manufacturing Engineering 305, and Economics 521. Computer Science, Mathematics, and Technology courses are recommended electives.

Business Administration Major with Computer Science Minor. With the rapid acceptance of electronic data processing by the business world, a strong minor in Computer Science is a valuable asset to the training of most Business Administration majors. The following courses constitute a minor in Computer Science:

Courses	Credits
CS 150 Introduction to Computer Science	3
CS 350 COBOL Programming	3
CS 450 File Management	3
CS 490 or 495 Special Projects	3
Two additional courses from the following: CS 340 or CS 380, CS 430, CS 475, CS 515, Philosophy 210	6
Total	18

Dr. Rex Hurst, in the Computer Center, can recommend additional courses for students desiring further work in Computer Science.

Business Administration Minor. A solid minor in Business can be extremely valuable when linked to a major in Agriculture, Landscape Architecture, Forestry, Science, Home Economics, etc. Any student who expects to operate his own business or professional office should strongly consider a Business minor. The following courses constitute a minor in Business Administration:

Courses	Credits
Acct 305 Survey of Accounting Principles	4
BA 511 Management Concepts	3
BA 550 Marketing Principles	5
BA 550 Fundamentals of Marketing	5
BA 441 Financial Institutions or BA 540	3

In special situations, students will benefit from a minor more specialized than the one specified above. Such minors are accepted subject to the approval of the head of the Department of Business

Administration. A general guideline is to have 15 credits representing courses outside the established core.

Graduation Requirement. To be recommended by the department for graduation, all Business Administration majors must have a grade point average of at least 2.2 in both their Business Administration courses and the courses in their minor field.

Graduate Study

The department offers the Master of Business Administration degree, designed to give the student special training of a general management nature aimed at providing a background for advancement into supervisory positions in business organizations. The MBA degree does not emphasize narrow specialization in any one of the functional fields of business; rather it is a general management degree aimed at developing potential business leadership. Training in the behavioral aspects of administration and in the newer quantitative tools is emphasized. The program provides small classes, intimate contact with professors, significant individual flexibility, and an emphasis on individual development.

The MBA degree is open to qualified students with a bachelor's degree regardless of their undergraduate major. Students with undergraduate majors in Engineering, Mathematics, Sociology, and Psychology are particularly welcome. Students with undergraduate majors in Business and Economics typically require 45 credits or three quarters to complete the program. Students with undergraduate degrees other than in Business or Economics may require up to 90 credits (six quarters) to complete their program depending on their undergraduate preparation. The last 45 credits of the program consist entirely of graduate courses. The student must either complete a thesis for 10 credits or complete BA 695 and 696, involving business research methods and reports. Details regarding the course work and requirements are found in the Graduate Catalog. Financial aid is available in the form of graduate assistantships for qualified students.

Business Administration Courses

Undergraduate

135. (20) Introduction to Business. An investigation of the role of business in contemporary society, including an introduction to the general problems of business operation. (3F, W, Sp) **Staff**

151. (63) Salesmanship. Focuses on the principles of the selling process — interviews, presentation, holding attention, arousing desire, meeting objections, and creating acceptance. Special selling projects are conducted. Lecture and cases. (2F, Sp) **Lowe**

201, 202, 203. (4, 5, 6) Business Law. BA 201 is a general survey. It is also introductory for students who take additional Commercial Law courses. BA 202 and 203 are devoted to a comprehensive study of the law of contracts and agency. (2F, W, Sp) **Benson**

290. (295) Independent Research and Reading. Credit arranged. (F, W, Sp, Su) **Staff**

301. (104) Business Law. Introduction to law and the law of contracts and agency. Not open to students who have had BA 201, 202, or 203. (3F) **Thurman**

302. (105) Business Law. The law of commercial paper, property, bailments and sales. Not open to students who have had BA 201, 202, or 203. (3W) **Thurman**

303. (106) Business Law. The law of partnerships, corporations, bankruptcy and suretyships. Not open to students who have had BA 201, 202, or 203. (3Sp) **Thurman**

321. (140) Insurance. Studied from the standpoint of the consumer of insurance services. Topics treated include: types of life, property, and casualty insurance contracts; nature and uses of life and property insurance; life insurance as an investment; and the organization, management and government supervision of insurance companies. (3Sp) **Staff**

323. (141) Real Estate. Introduction to real estate contracts, forms, principles, and recent federal housing legislation. (3W) **Lowe**

424. (142) Advanced Problems in Real Estate. Advanced course in financial and management problems regarding the use and development of real property. (3Sp) **Lowe**

430. (145) Management of International Operations. Analysis of key managerial problems encountered in operating business enterprises abroad. Specifically covers areas such as: foreign investment and balance of payments, environmental issues, common markets, developing areas, planning and controlling U.S. operations abroad, nationalism and international business, management systems in different countries, etc. Prerequisites: BA 511, 550, 540. (3W) **Shetty**

435. (147) Managing Small Business. Application of management principles and techniques to the independent, owner-manager type of firm. Prerequisite: Junior standing or above. (4F, Sp) **Taylor**

436. (148) Managing Tourist Enterprise. Relates effective management and marketing principles and procedures to the specific problems involved in tourist-oriented organizations such as hotels, motels, and food service operations. Problems of starting, purchasing, or franchising a tourist business; effective delivery of services. (3) **Staff**

441. (180) Financial Institutions. Defines the role of the major financial institutions in the American economy in supplying loanable funds to consumers, business, and government. Special emphasis on the role of commercial banks as the major supplier of short-term credit in the economy. Prerequisites: Economics 200, 201, Accounting 201, 202, 203, Math 241. (3F, Sp) **Walton**

446. (185) Investments. Common stock and bond valuation theories. Investment portfolio practices. Analysis of security types as investment alternatives for individuals and institutions. Prerequisites: Economics 200, 201, BA 441 (3F, W) **Randle, Walton**

448. (186) Security Analysis. Special methods used in analysis of industrial, public utility, railroad and other securities. Taxation of investment income and its relation to investment policy. Development of principles for timing and selection of securities for investment portfolios. Prerequisite: BA 446. (3W, Sp) **Walton**

449. (182) Problems in Finance. Application of basic principles of finance to specific cases and problems of a typical nature. Prerequisites: BA 540, Economics 560. (3W) **Randle**

451. (157) Consumer Behavior. Contributions from the behavioral sciences that give understanding of the behavior of consumers with respect to various products, business firms, and marketing strategies. Prerequisites: Psychology 101, Sociology 101, BA 550. (3W) **Williams**

452. (158) Quantitative Techniques for Marketing. Selected quantitative techniques designed to improve productivity of marketing operations. Includes sales forecasting, distribution cost analysis, probablistic decision models, game theory, profit maximization models. Prerequisites: BA 506, 550. (3W) **Williams**

453. (159) Marketing Research. Techniques of research for marketing; examination of scientific methods; problem solving methods; questionnaire design; survey sampling; analysis and application of marketing information. Prerequisites: BA 506, 451. (4Sp) **Dickey**

454. (161) Retailing. The marketing process from the viewpoint of the retail distributor: types of retail institutions, accounting and statistics, location, store layout, merchandise classification, service policies, pricing, brand policies, buying, merchandise control, advertising and sales promotion, general organization and administration policies. Prerequisite: BA 550. (4F) **Dickey**

455. (162) Sales Management. Recruiting, selection, training, compensation, and motivation of the sales force. An overview of the nature of the sales manager's job in planning and execution of the firm's sales strategy. Prerequisite: BA 550. (3F) **Dickey**

456. (163) Industrial Marketing. Planning, organization, and operations in the marketing of industrial products. Nature and import of the wholesaler's activities in the marketing structure. Prerequisite: BA 550. (3W) **Dickey**

457. (165) International Marketing. International marketing management; marketing tools as a means of adapting the individual domestic business firm to the international environment. Prerequisite: BA 550. (3W) **Williams**

458. (166) Advertising. Exploring the advertising function in the marketing firm. Stresses the use of advertising in the promotional mix, message and media strategy, advertising creativity, and the role of the advertising agency. Prerequisite: BA 550. (4W) **Williams**

459. (169) Marketing Management. Analysis of major aspects of marketing in the business firm. Summarizes the Marketing major and provides detailed analysis of marketing management problems through test and case analysis. Prerequisite: All Marketing courses for major completed or underway. (4Sp) **Williams**

461. (174) Employment Practices. Application of personnel management techniques to the industrial problem related to recruitment, selection and placement of employees. (3F) **Marston**

463. (175) Wage and Salary Administration. Analysis of compensation policies and programs, job evaluation programs, job pricing, wage and salary surveys, administration and other related problems. (3W) **Marston**

469. (178) Problem Personnel and Industrial Relations. Application of principles of personnel administration to specific personnel and industrial relations problems commonly found in industry. Case studies and problems are emphasized. (A terminal course for Personnel and Industrial Relations majors and minors.) (3Sp) **Marston**

472. (136) Procurement and Production Control. Planning and direct control of materials and production activities. Includes industrial purchasing; planning and control of inventories, and planning and control of production. Prerequisites: BA 511, 570, 509. (5F) **A. Kartchner**

479. (137) Production Management II. Credit arranged. **Staff**

482. (117) Introduction to Computer Systems. Basic computer logic, flow charting, routines, coding, library programs, and data processing application to business. (3Sp) **E. Kartchner**

484. (118) Integrated Information Systems. Principles of job planning and procedure development as applied to the electric accounting machine method of keeping records and processing statistical data. (3F) **E. Kartchner**

489. (149) Business Policy. A coordinating course to develop perspective, judgment, and facility in solving problems in production, distribution, personnel, finance, control, and social aspects of business. Prerequisites: BA 507, 511, 515, 550, 560, 540. (5C, Sp, Su) **Carlisle, Papenfuss, Shetty**

490. (295) Independent Research and Reading. Credit arranged. (F W Sp Su) **Staff**

501. (204) Survey of Business Law. A detailed investigation of the law and business, especially the application of state and federal laws to free enterprise and business operations. Law involved in business transactions especially as it applies to property used in business. Legal basis of the conduct of modern economic activity. (3F) **Thurman**

506. (131) Business Statistics. Descriptive statistics, probability and probability distributions, sampling theory estimation and tests of hypothesis. Prerequisites: Math 135, 241, 242. (3F, W, Su) **A. Kartchner, E. Kartchner**

507. (132) Business Statistics. Inferential statistics, statistical decision theory, simple linear regression and correlation, chi-square, analysis of variance, time series analysis and index numbers. Prerequisite: BA 506. (3W, Sp, Su) **A. Kartchner, E. Kartchner**

509. (138) Quantitative Methods for Production Management. Basic concepts of operations research techniques. Topics include model building and manipulation, linear programming, network analysis, statistical process, contro, line balancing, etc. Prerequisite: BA 507. (4Sp) **A. Kartchner, E. Kartchner**

511. (133) Management Concepts. Investigation and application of fundamental concepts of management and organization theory. Prerequisite: Junior standing or above. Business majors should take this course Fall or Winter term of the Junior year. (4F, W, Sp, Su) **Carlisle, Shetty, Taylor**

513. (113) Business Simulation. Principles of model building and a simulation of actual business problems as practice in decision making. (2Sp) **E. Kartchner**

515. (150) Managerial Accounting. Emphasizes the use of accounting as a tool of control for managerial control, break-even analysis selection of alternatives. Prerequisites: Accounting 201, 202, 203, BA 507, 511. (5F, Sp, Su) **Staff**

540. (181) Corporation Finance. How the corporation raises and manages its capital. A study of modern financial principles, methods, policies, and institutions. Corporate organization, creation, and reorganization. Prerequisites: Economics 200, 201, Accounting 201. (5F, W, Sp) **Randle, Walton**

550. (151) Fundamentals of Marketing. Nature and history of marketing; analysis of the behavior of customers and marketing executives; introduction to the tasks of the marketing manager, marketing institutions, policies, and programs. Prerequisite: Junior standing or above. (5F, W, Sp, Su) **Dickey, Williams**

560. (171) Personnel Administration. Critical analysis of problems of human relations that confront the manager of a business enterprise and of policies and methods of dealing effectively with these problems. Lectures, problems, and selected cases. Prerequisite: Junior standing or above. (5F, W, Sp, Su) **Cragun, Marston, Mecham, Shetty**

570. (134) Production. The production function and its problems, interrelationships with other business activities. Managerial aspects of production planning, procurement, inventory control, production control, quality control, layout, methods improvement, performances standards, and basic industrial processes. Prerequisites: BA 506, 511, Math 105, 241, 242. (5F, W, Sp, Su) **A. Kartchner**

Graduate

604. (240) Free Enterprise and Public Policy. Problems involved in doing business with the government. Public policies with regard to government procurement, research and development, production, personnel practices, contracting, renegotiation, contract termina-

tion, ownership of facilities, marketing and pricing, etc. (3W) **Buehler, Carlisle**

606. (293) Seminar in Social Responsibility. An analysis of social responsibility concepts and an analytic discussion of the issues in social responsibility confronting businessmen in their relations with employees, their customers, and the public and government. (3Sp) **Thurman**

610. (235) Quantitative Methods in Business. Study and analysis of various statistical models and their application to the decision-making function of the modern business administrator. Deals with quantitative methods for decision making under conditions of certainty, risk, and uncertainty. (3Sp) **A. Kartchner, E. Kartchner**

613. (291) Seminar in Management Theory. Review and evaluation of recent theories of management and organization. Traditional theories in terms of the impact of behavioral and mathematical sciences. (3F) **Carlisle**

635. (250) Managerial Economics. Integration of economic theory with business practice and policies for the purpose of facilitating decision making and forward planning. (3F) **Randle**

642. (281) Advanced Finance Problems. An analytic treatment in depth in selected areas of financial management designed to further the student's understanding of the financial management function and the importance it has to the firm. (3W) **Randle**

652. (251) Advanced Marketing Problems. An advanced case approach to current marketing management problems. Emphasis on concepts, research, techniques, decision making, and marketing strategy development. (3W) **Dickey**

662. (271) Human Aspects of Administration. An investigation of problems related to the proper use of human resources in business and industry, and their effects on administrative policies and decisions. (3W) **Mecham, Shetty**

664. (294) Organizational Behavior. A graduate seminar to study the behavioral philosophies and theories basic to an understanding of human behavior in organizations. (3F, Su) **Cragun**

667. (292) Seminar in Labor Relations. Theory of the labor movement and the role of labor in today's industrial society. (3W) **Marston**

680. (212) Administrative Control. Defining the theory of control systems. Management techniques in administrative control covering both financial and physical control systems. (3F) **E. Kartchner**

682. (218) Computer and Systems Management. The computer as a management control system and its role in modern society. Investigation of systems analysis and design as they relate to management activities. (3Sp) **Carlisle, E. Kartchner**

689. (249) Advanced Business Policy. Analysis of problems from a managerial point of view, considering all functions and policy areas. Integrates subject matter of marketing, production, finance, accounting, personnel and other associated areas in case problems typically faced by management. (3Sp) **Buehler, Papenfuss**

690. (295) Independent Research and Reading. Credit arranged. (F, W, Sp, Su) **Staff**

695. (230) Business Research Methods. Methods and techniques of collecting, analyzing, and interpreting business data. (3F) **Mecham**

696. (231) Business Problems I. Each student is to undertake independently a business study culminating in one major business report. Seminar analysis of topics, contents and research methods used. Prerequisite: BA 695. Open only to non-thesis MBA students. Meets requirements of one Plan B report. (3W, Sp, Su) **Staff**

697. (290) Thesis. For students preparing a master's degree thesis. Credit arranged. (F, W, Sp, Su) **Staff**

699. (400) Continuing Graduate Advisement. **Staff**

*Department of

Business Education and Office Administration

Head: Associate Professor Theodore W. Ivarie

Office in Business 711

Professors L. Mark Neuberger, Harold R. Wallace

Associate Professors Lloyd W. Bartholome, Floris S. Hendersen

Assistant Professors Earl E. Halvas, Garth A. Hanson, F. Kent Horlacher, Helen Lundstrom, William D. Woolf

Degrees: Bachelor of Arts (BA), Bachelor of Science (BS), Master of Science (MS), Doctor of Education (EdD) with specialization in Business Education awarded through College of Education

Major: Composite in Business Education, Composite in Distributive Education, Office Administration, Combination of Office Administration and Family Life

The Department of Business Education and Office Administration offers three curricula which provide students with opportunities to pursue degrees that prepare them to teach business subjects or to work in office positions.

The Business Education curriculum and Distributive Education curriculum give broad backgrounds in major fields of business. In addition, students will take all necessary courses leading to a teaching certificate as established by the Utah State Board of Education. Four Business Education minors are available to students majoring in another field of teacher education preparation.

Students must complete the last 45 credits of course work leading to the bachelor's degree in residence at USU. These students should complete an "application for admission to teacher education" before the Junior year (see College of Education for requirements). Approval is a prerequisite to teacher certification candidacy and to enrollment in Education courses.

In Office Administration, students will have an opportunity to take all the courses needed to prepare them in the secretarial or administrative services fields as well as to pursue a minor field of their own choice. This program can lead to a highly respected, top-level office position. A non-stenographic Office Administration major can be developed for those desiring careers as office managers.

Undergraduate Study

Business Education Composite Major. The College of Business and the College of Education cooperate in the preparation of students for professional careers in Business Education and Distributive Education. Both undergraduate and graduate programs in Business Education and Distribu-

*In College of Business.

tive Education are available for students preparing to teach, as well as for experienced teachers or business subjects.

The following is a list of requirements for students preparing to enter the Business Education profession. The program of studies for transfer students will be adjusted to meet the minimum professional certification requirements and to allow for acceptance of transfer credit, if such courses are comparable to those offered at USU.

Courses			Credits
BE	112	Intermediate Typewriting	2
BE	113	Advanced Typewriting	2
BE	131	Business Machines	2
BE	201	Office Practice	2
BE	241	Office Data Systems	3
BE	351	Business Communications	3
BE	441	Secretarial Procedures **or**	
CS	350	Programming Business Problems	3
BE	461	Principles of Business Education	3
BE	541	Office Management	3
BE	571	Methods of Teaching Cooperative Education	3
BE	572	Methods of Teaching Business — Non-skilled	3
BE	573	Methods of Teaching Typewriting and Office Practice	3
BE	581	Managing Personal Finances	5
BA	201	Business Law	2
BA	202	Business Law	2
BA	203	Business Law	2
BA	506	Business Statistics **or**	
Psych	380	Statistical Methods	3
BA	511	Management Concepts	4
BA	540	Corporation Finance	5
BA	550	Fundamentals of Marketing	5
BA	560	Personnel Administration	5
Acct	201	Introductory Accounting	3
Acct	202	Introductory Accounting	3
Econ	200	General Economics	5
Econ	201	Economics Problems	5
CS	150	Introduction to Computer Science	3

Business Education majors planning to prepare for teaching shorthand and related subjects are required to complete the following courses in addition to those listed above:[1]

BE	124	Dictation and Transcription I	5
BE	574	Methods of Teaching Shorthand and Transcription	3

In addition, the following courses must be competed to qualify for secondary school certification in Utah:

[2]Psych	101	General Psychology	5
Psych	110	Human Development: General	3
Psych	366	Educational Psychology	3
PubH	456	School Health for Secondary Teachers	3
Sec Ed	301	Foundation Studies in Teaching	5
[3]BE	450	Secondary Curriculum Seminar	3
[3]BE	460	Student Teaching in Secondary Schools	12

Students who have taken shorthand in high school will be placed in the appropriate level shorthand course by means of an evaluation of their proficiency. Any shorthand courses that are bypassed may be replaced by elective courses. Students who have had typewriting in high school should register for BE 112, Intermediate Typewriting, where they will be given proficiency tests to determine appropriate placement.

Business Education methods courses should be taken in the Junior year if student teaching is to be taken fall or winter quarter of the Senior year. BE 461, Principles of Business Education, should be taken in the Sophomore year prior to the methods courses.

Some special Business Education methods classes, such as 571, 572, 573, or 574 count toward the 32-credit professional certification requirement.

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[1]BE 571, Methods of Teaching Cooperative Education is recommended strongly but not required.

[2]Prerequisite to Psychology 110 and 366.

[3]Special methods classes in Business Education must be completed prior to student teaching.

Distributive Education Composite Major. The Distributive Education curriculum also leads toward qualifying for a secondary teaching certificate. This program prepares individuals to train and supervise high school students and adults to become better salesmen and retailers through cooperative work experience programs in business firms.

The following is a list of requirements for students preparing to enter the Distributive Education profession. The program of studies for transfer students will be adjusted to meet the minimum professional certification requirements and to allow for acceptance of transfer credit if such courses are comparable to those offered at USU.

Composite Major in Distributive Education

Courses			Credits
BE	131	Business Machines	2
BE	351	Business Communication	3
BE	461	Principles of Business Education	3
BE	561	Principles and Methods of Distributive Education	3
BE	571	Methods of Teaching Cooperative Education	3
BE	572	Methods of Teaching Business — Non-skilled	3
BE	581	Managing Personal Finances	5
BA	151	Salesmanship	2
BA	201	Business Law	2
BA	202	Business Law	2
BA	203	Business Law	2
BA	506	Business Statistics **or**	
Psych	380	Statistical Methods	3
BA	451	Consumer Behavior	3
BA	454	Retailing	4
BA	458	Advertising	4
BA	511	Management Concepts	4
BA	540	Corporation Finance	5
BA	550	Fundamentals of Marketing	5
BA	560	Personnel Administration	5
Acct	201	Introductory Accounting	3
Acct	202	Introductory Accounting	3
Econ	200	General Economics	5
Econ	201	Economic Problems	5

The following courses are recommended strongly although not required, for the Distributive Education major:

BA	435	Managing Small Business	4
BE	112	Intermediate Typewriting	2
BE	113	Advanced Typewriting	2
BE	573	Methods of Teaching Typewriting and Office Practice	3
CS	150	Introduction to Computer Science	3

In addition, the following courses must be completed to qualify for a secondary school teaching certificate in Utah:

[1]Psych	101	General Psychology	5
Psych	110	Human Development: General	3
Psych	360	Educational Psychology	3
PubH	456	School Health for Secondary Teachers	3
Sec Ed	301	Foundation Studies in Teaching	5
[2]BE	450	Secondary Curriculum Seminar	3
[2]BE	460	Student Teaching in Secondary Schools	12

BE 561, Principles and Methods of Distributive Education, and BE 571, Methods of Teaching Cooperative Education, should be taken in the Junior year. BE 461, Principles of Business Education, should be taken prior to BE 561 and BE 571.

Some special Distributive Education methods classes, such as BE 561, 571, or 572 count toward the 32-credit professional certification requirement.

Business Education Minors

Four teaching minors are offered in Business Education: 1) Typewriting and Clerical Office Practice, 2) Typewriting and Shorthand, 3) Bookkeeping and Basic Business, 4) Bookkeeping and Data Processing. These are approved by the State Board of Education as submitted by the dean of the College of Education. These minors are explained in the document, "Teaching Majors and Minors for Secondary School Teachers," and is distributed by the Department of Secondary Education.

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[1]Prerequisite to Psychology 110 and 360.

[2]BE 561, 571, 572 must be completed prior to student teaching.

Graduate Study

The Department of Business Education offers courses leading to Master of Science degrees in Business Education and Distributive Education and provides special emphasis in Business Education for the Doctor of Education degree in Curriculum Development and Supervision. The program established lends itself to a desirable working relationship with major professors and allows sufficient flexibility in the program to provide the necessary emphasis needed for individual research and development. Financial assistance is available to outstanding students in the form of graduate assistantships. See Graduate Catalog for further information.

Office Administration

The program of Office Administration is arranged on a four-year degree pattern. Students who initially enroll for only two years may change to a four-year degree program by completing all of the following courses in addition to University lower division group requirements.

Office Administration Major

Courses			Credits
BE	112	Intermediate Typewriting	2
BE	113	Advanced Typewriting	2
BE	124	Dictation and Transcription I	5
BE	131	Business Machines	2
BE	201	Office Practice	2
BE	241	Office Data System	3
BE	351	Business Communications	3
BE	441	Secretarial Procedures	3
BE	541	Office Management	3
BE	581	Managing Personal Finances	5
BA	201	Business Law	2
BA	202	Business Law	2
BA	203	Business Law	2
BA	506	Business Statistics	3
BA	511	Management Concepts	4
BA	540	Corporation Finance	5
BA	550	Fundamentals of Marketing	5
BA	560	Personnel Administration	5
Acct	201	Introductory Accounting	3
Acct	202	Introductory Accounting	3
Econ	200	General Economics	5
Econ	201	Economic Problems	5
CS	150	Introduction to Computer Science	3

To enroll in any skill course, students must have a grade of "C" or better in the preceding course in the same skill.

Office Administration majors planning to complete baccalaureate requirements are required to select a minor that has the approval of the Office Administration adviser.

Combination Major in Office Administration and Family Life

This curriculum is designed for women who desire sufficient secretarial training to provide career opportunities outside the home as well as a basic training for family living.

The Office Administration program is combined with the Family Life program. Completion of these requirements, in addition to University and group requirements, leads to a Bachelor of Science degree.

Courses Required

Courses			Credits
BE	112	Intermediate Typewriting	2
BE	113	Advanced Typewriting	2
BE	124	Dictation and Transcription I	5
BE	131	Business Machines	2
BE	201	Office Practice	2
BE	241	Office Data Systems	3
BE	351	Business Communications	3
BE	441	Secretarial Procedures	3
BE	541	Office Management	3
BA	201	Business Law	2
BA	202	Business Law	2
BA	511	Management Concepts	4
Acct	305	Survey of Accounting Principles	4
Econ	200	General Economics	5
CS	150	Introduction to Computer Science	3

Family Life Courses require forty-five credits with not fewer than nine in each department. Classes are to be selected in consultation with the student's adviser.

Business Education Courses

Undergraduate

111. (OA 41) Elementary Typewriting. For students with no previous training in typewriting. Designed to develop a thorough knowledge of the keyboard and machine parts. Personal-use typing problems, centering letter styles. (2F, W, Sp) **Bartholome**

112. (OA 42) Intermediate Typewriting. Assumes previous training in typewriting. Emphasis on skill building, typing of letters, envelopes, manuscripts, business forms and tabulation exercises. Prerequisite: BE 111 or equivalent. (2F, W, Sp, Su) **Bartholome**

113. (OA 43) Advanced Typewriting. The development of number proficiency, statistical tabulation, and typing on business forms, rough drafts, or stencils for duplication. Prerequisite: BE 112. (2F, W, Sp) **Bartholome**

121. (OA 75) Fundamentals of Shorthand I. Assumes no previous training in shorthand. (5F, W) **Hendersen**

122. (OA 76) Fundamentals of Shorthand II. Introduction of new-matter dictation. Prerequisite: BE 121 or equivalent. (5F, W, Sp) **Hendersen**

123. (OA 77) Fundamentals of Shorthand III. Intensive practice in new matter dictation. Prerequisite: BE 122 or equivalent. (3F, W, Sp) **Horlacher**

124. (OA 141) Dictation and Transcription. A continuation of the study of shorthand fundamentals and a development of transcription skill. Admission to 124 should require a minimum dictation speed of 80 words a minute and a minimum grade of "C" in the course immediately preceding the course in which a student wishes to enroll. Prerequisites: BE 123 or equivalent, and BE 112. (5F, 5W, 5Sp) **Hendersen, Horlacher**

129. (OA 78) Refresher Shorthand. A shorthand review course for those who need speed building and theory review to prepare for employment or for continuation in advanced shorthand and transcription. Taught only as extension or a five-week summer course. (2Su and as needed) **Hendersen**

131. (OA 92) Business Machines. Basic training in the use of ten-key adding-listing machines, printing calculators, and rotary calculators. (2F, W, Sp, Su) **Horlacher**

201. (OA 167) Office Practice. Training in use of dictating and transcribing machines, photo-copy equipment, varityper, and spirit, stencil and offset duplicators. Prerequisite: BE 112. (2F, W, Sp, Su) **Hanson**

241. (OA 85) Office Data Systems. Basic principles involved in data storage, processing, and retrieval by modern electric office equipment. (3F, W, Sp) **Staff**

351. (OA 133) Business Communications. The development and application of effective business writing skills. Primary emphasis given to the business report as a tool for effective written communication. Prerequisites: English 101, 102, 103. (3F, W, Sp, Su) **Neuberger, Wallace**

441. (OA 186) Secretarial Procedures. Office routines, with special emphasis on use of reference books, transportation and travel, use of telephones, telegraph, and cablegram services, financial records, writing for publication, minutes and meetings. (3Sp) **Hendersen**

450. (new) Secondary Curriculum Seminar. Considers the problems arising during student teaching. Discusses planning, teaching procedures, adapting classroom practices to individual differences, testing, and evaluation. To be taken during the same quarter as BE 460. Prerequisite: Admission to Teacher Education. (3F, W, Sp, Su) **Staff**

460. (new) Student Teaching in the Secondary School. Members of the class are assigned to a sponsor teacher in secondary schools for student teaching in their major and minor subjects. A brief period of observation is followed by gradually increasing responsibilities until, upon completion of the assignment, the student has had guided experiences in all professional reponsibilities of the typical faculty member in the secondary school. Prerequisites: Admission to Teacher Education, Psychology 110, 366, Secondary Education 301 and Special Methods in major and/or minor subjects. (6F, W, Sp) **Staff**

461. (189) Principles of Business Education. (3F, Sp) **Ivarie**

541. (OA 175) Office Management. Duties and responsibilities of the office manager, types of organization, methods of control, office arrangement and equipment, job analysis, selection, employment and training of employees. (3F, Sp) **Wallace**

561. (150) Principles and Methods of Distributive Education. (3F) **Woolf**

571. (155) Methods of Teaching Cooperative Education. Includes instructional materials, individual instruction kits, finding and maintaining training stations, selection of students, desirability of advisory committees and student club activities. Prerequisite: BE 561 or instructor's consent. (3W) **Wallace**

572. (178) Methods of Teaching Business — non-skilled. Methods of teaching as applied to basic courses: General Business, Business Law, Business Principles, Business Arithme-

tic, Economic Geography, etc. Also, a study of methods applicable to record-keeping and bookkeeping. This course is designed for the inexperienced business teacher education student. (3F, W) **Wallace, Woolf**

573. (179) Methods of Teaching Typewriting and Office Practice. Methods for building accuracy, speed, and increasing production; work standards; classroom equipment and materials. Also, includes instructional methods and materials in teaching of office practice and business machine, class organization plans, equipment needs, cooperative training, standards and evaluation. For the inexperienced business teacher education student. Prerequisite: BE 112, 113. (3F, W) **Bartholome**

574. (180) Methods of Teaching Shorthand and Transcription. Shorthand transcription, business English, filing and secretarial procedure. Includes factors affecting speed building and standards and grading in shorthand, and transcription. For the inexperienced business teacher education student. Prerequisite: BE 124. (3F, Sp) **Hendersen**

581. (185) Managing Personal Finances. How to avoid financial entanglements, installment buying, borrowing money, owning or renting a home, investing and speculation in securities, everday legal problems dealing with illness, death, personal taxes. (5F, Sp, Su) **Wallace**

595. (295) Independent Readings in Business Education. Credit arranged. (F, W, Sp, Su) **Ivarie**

Graduate

611. (270) Workshop in Business Education. Intensive one- or two-week workshop. Credit arranged. (Su) **Staff**

621. (255) Office Technology. A look at data systems, peripheral office equipment, and methods pertinent to curriculum improvement. (3 Su and as needed) **Horlacher**

625. (267) Supervised Work Experience. Active participation in approved business offices for the purpose of gaining work experience directly related to office education. Selection of training stations must be approved by college supervisor at least one quarter ahead of registration. Credit arranged. (Su and as needed) **Hanson, Woolf**

660. (268) Vocational Internship. Student teaching at the graduate level in approved high school or post-secondary programs. A team teaching philosophy will be employed as the cooperating teacher and student teacher attempt to provide for students' individual differences. Credit arranged. (Su and as needed) **Hanson, Wallace, Woolf**

661. (250) Issues and Trends in Business Education. (3Su and as needed) **Horlacher, Ivarie**

662. (260) The Business Curriculum. Principles, concepts, methods, and procedures of studying, changing and construction of business offering in the secondary schools and colleges. (3Su and as needed) **Bartholome, Ivarie**

662. (260) The Business Curriculum. Principles, concepts, methods, and procedures of studying, changing and construction of business offerings in the secondary schools and colleges. (3Su and as needed) **Bartholome, Wallace**

665. (225) Adult Programs in Business Education. Emphasis placed on the role of the business education teacher in adult programs. (3Su and as needed) **Bartholome, Woolf**

671. (235) Improvement of Instruction in Distributive Education. Designed for the in-service distributive education teacher. Objectives, instructional materials available and teaching techniques as they relate to distributive education. (3Sp and as needed) **Woolf**

672. (240) Improvement of Instruction in Basic Business. (3Su and as needed) **Bartholome, Wallace**

673. (210) Improvement of Instruction in Typewriting. Basic factors of typewriting skill and improvement of methods and techniques in typewriting for the experienced business teacher. (3Sp and as needed) **Bartholome**

674. (220) Improvement of Instruction in Shorthand and Transcription. Designed for in-service teachers of shorthand and transcription. Improved methods and techniques applicable to the teaching of shorthand and related courses in the high school and junior college level. (3Su and as needed) **Horlacher**

675. (230) Improvement of Instruction in Bookkeeping and Accounting. Designed for the in-service teacher of bookkeeping and accounting. Improved methods and techniques for in-service business teachers at the secondary school and college levels. (3Su and as needed) **Bartholome**

676. (245) Cooperative Programs in Business Education. Workshop and research activities for the high school teacher supervising a work-experience program. (3Su) **Wallace**

681. (280) Seminar in Business Education. An analysis of research methods, applicable to business education. (3W, Su) **Horlacher**

695. (295) Independent Research and Reading. Credit arranged, and taught as needed. (F, W, Sp, Su) **Staff**

697. (290) Research in Business Education. Master's level thesis or Plan B. Research credit. Credit arranged. (F, W, Sp, Su) **Staff**

699. (400) Continuing Graduate Advisement. Credit arranged. (F, W, Sp, Su) **Staff**

761. (364) Articulation of Business Education. (3Su) **Ivarie**

795. (295) Independent Research and Reading. Credit arranged. (F, W, Sp, Su) **Staff**

797. (290) Research in Business Education. Doctoral level dissertation research credit. Credit arranged. (F, W, Sp, Su) **Staff**

799. (400) Continuing Graduate Advisement. Credit arranged, and taught as needed. **Staff**

**Department of*

Chemistry

Head: Professor Garth L. Lee

Office in Maeser Laboratory 106

Professors Melvin C. Cannon, Thomas F. Emery, R. Gaurth Hansen, Ralph M. Johnson, William M. Moore, Grant Gill Smith, Jack T. Spence, Harris O. Van Orden

Associate Professors Richard C. Anderson, Bruce F. Burnham, Richard K. Olsen

Assistant Professors Terry D. Alger, Thomas M. Farley, Joseph G. Morse, Karen W. Morse, James W. Sinclair

Degrees: Bachelor of Arts (BA), Bachelor of Science (BS), Master of Science (MS), Doctor of Philosophy (PhD)

Majors: Chemistry, Biochemistry

(See also Division of Biochemistry, page 109.)

Chemistry pervades our whole society. Chemical products are used by everyone. All manufacturing industries use chemicals. All disciplines in the physical and life sciences require a background in chemistry. The chemical industry itself is one of the largest industries in America, and the American Chemical Society is the largest professional society in the world. The Chemistry staff at USU is widely recognized and well qualified to give the background courses necessary for a broad education, to give the basic courses for engineers and scientists, and to give the training required for a career in the great industrial world of chemistry. The program offered for a degree in Chemistry is fully approved by the American Chemical Society. Our graduates are well received in industry and are accepted as candidates in the finest graduate schools in the world. Those with advanced degrees have assumed positions of leadership in education and industrial research. The faculty are deeply involved in research and in keeping abreast of new developments. A recent addition to the chemistry building offers modern

*In College of Science.

facilities for teaching and research.

Undergraduate Study

Major. The Bachelor of Science degree entails considerable specialization in Chemistry. It includes, among other things, several graduate courses and an oral presentation of a seminar on an advanced topic. A student who fulfills the University requirements for graduation, passes the courses in Mathematics, Physics and Chemistry listed for that degree with a grade point average of 2.25, and has a reading knowledge of German (usually demonstrated by completion of German 101-102-103) will receive a BS degree and will have his name entered on the list of certified graduates of the American Chemical Society.

The following courses in Chemistry are required for the BS degree: Chemistry 121, 122, 123, 331, 332, 333, 334, 306, 307, 308, 309, 310, 311, 360, 490, 552, 564; plus nine credits in advanced courses selected from the following: Chemistry 601, 602, 603, 625, 626, 627, 650, 651, 662, 670, 672, 676, 704, 775; Physics 370, 323; Math 441, 442, 443. Prerequisites necessary for some of the upper division courses in the program are Physics 221, 222, 223 and Math 220, 221, 222, 223, 324.

A major with a Bachelor of Arts degree is offered for those who desire a broader base of training in the arts, humanities, or social sciences. Two years of courses in a foreign language are considered a minimum for a broad education and are required for the BA degree.

A minimum of 45 credits in Chemistry is required for the BA degree and the following courses must be included: Chemistry 121, 122, 123, 331, 332, 333, 334, 306, 307, 308, 309, 310, 311, 360, with the same requirements in Math and Physics as for the BS degree.

Minor. A minimum of eight credits of upper division Chemistry courses is required for an approved minor in Chemistry. Suggested courses are: Chemistry 301, 360, 331, 332, 370, 670.

Teaching Major. A teaching major in Chemistry requires the completion of the following minimum program: Chemistry 121, 122, 123, 141, 301, 331, or 370; Physics 111, 112, 113, or 221, 222, 223, 370, 323 or 326 or 321; Math 106, 220, 221, 222, 311 or 305; Philosophy 210 or 522, or History 505 or 506. Required professional education courses for the teaching certificate are listed by the College of Education.

Teaching Minor. A teaching minor in Chemistry is approved by the State Board of Education as submitted by the dean of the College of Education. This minor program is explained in the document, *Teaching Majors and Minors for Secondary School Teachers,* and is distributed by the Department of Secondary Education.

An "application for admission to teacher education" should ordinarily be completed before the Junior year (see College of Education for requirements). Approval is a prerequisite to teacher certification candidacy and to enrollment in Education and Psychology courses.

A better preparation for the teaching of Chemistry is possible with a combined BA degree and teaching certificate.

Suggested curricula for BA and BS degrees in Chemistry:

Lower Division

FRESHMAN YEAR	Credits		
Courses	F	W	Sp
Chem 121, 122, 123	5	5	5
Math 106, 220, 221	5	5	5
English 101, 102, 103	3	3	3
MS, AS, or PE	1	1	1
Electives	3-5	3-5	3-5
Totals	17-19	17-19	17-19

SOPHOMORE YEAR			
	F	W	Sp
Chem 331, 332, 333, 334	4	4	5
Math 222, 223, 324	5	5	5
Physics 221, 222, 223	5	5	5
Electives	0-4	0-4	0-4
Totals	14-18	14-18	15-19

Upper Division

JUNIOR YEAR			
	F	W	Sp
Chem 306, 307, 308	3	3	3
Chem 309, 310, 311	1	1	1
Chem 360, 564	4	3	
[1]Chem 552			4
Electives	7-10	8-11	7-10
Totals	15-18	15-18	15-18

SENIOR YEAR	
[1]Advanced courses	9
[1]Chem 499	1
[1]Chem 480, 498 (or elective)	3
Electives	32-41
Total	45-54

Graduate Study

Entrance Examinations. All entering graduate students must take entrance examinations in Analytical, Inorganic, Organic, and Physical Chemistry.

Master of Science Degree. The Chemistry Department offers the Master of Science degree with research in any one of the following fields: Analytical, Biological, Inorganic, Organic, and Physical Chemistry.

Doctor of Philosophy Degree. The Chemistry Department offers advanced study and research leading to the Doctor of Philosophy in Chemistry. Before admission to candidacy the student must fulfill the following requirements: 1) demonstrate a reading comprehension of German or Russian, 2) pass a comprehensive examination in the field of specialization, not later than one academic year before the final examination on the thesis, 3) present an acceptable statement of a thesis problem. The student should consult the School of Graduate Studies or the head of the department concerning other requirements.

[1]Not required for BA degree.

Chemistry Courses

Undergraduate

105. (31) Physical Science. History and philosophy of physical science, emphasizing the ideas and methods of science from the Greeks to modern atomic theory. Fulfills group requirements in Physical Science. Three lectures. (3F, Sp) **Staff**

111. (10) General Chemistry. For non-science majors. Prerequisites: One unit of high school or college algebra. Four lectures and one recitation. (5F, W, Su) **Staff**

112. (11) General Chemistry. Continuation of 111. Three lectures and one recitation and one lab. (5W, Sp, Su) **Staff**

121. (20) Chemical Principles and Qualitative Analysis. For science majors, pre-medical and pre-dental students and those who will take additional chemistry courses. Prerequisites: Two of the following high school courses: Advanced algebra, chemistry, physics or equivalent. Four lectures and one recitation. (5F, W) **Staff**

122. (21) Chemical Principles and Qualitative Analysis. Continuation of 121. Three lectures, one recitation and one lab. (5W, Sp) **Staff**

123. (22) Chemical Principles of Qualitative Analysis. Continuation of 122. Three lectures and two labs. (5F, Sp) **Staff**

141. (12) Elementary Organic Chemistry. Designed to follow 112 and complete a one-year terminal course in Chemistry. Four lectures, one lab. (5F, Sp) **Staff**

195. (155) Glass Blowing. A laboratory course in the technique of manufacturing and repairing laboratory glassware. Alternate years. (2W) **Blau**

301. (101) Elementary Physical Chemistry for Biologists. A lecture survey of basic quantitative laws governing chemical processes, applied to examples of biological interest. Mathematical derivations are kept to a minimum. Recommended as a prerequisite for those interested in biological or medical research. Prerequisites: Chem 111, Math 105 or equivalent. Four lectures. (4F) **Staff**

306, 307, 308. (104, 105, 106) Physical Chemistry. Quantitative methods for solving problems in chemical thermodynamics, phase change, electrochemistry, reaction kinetics, quantum theory, and molecular structure. Prerequisites: Chem 123, Physics 223, Math 324. Three lectures. (3F, W, Sp)
Alger, Moore, Sinclair

309, 310, 311. (109, 110, 111) Experimental Physical Chemistry. Work correlated with Chem 306, 307, 308. (1F, 1W, 1Sp)
Alger, Moore, Sinclair

331, 332. (121, 122) Organic Chemistry. Fundamentals of the chemistry of carbon compounds. Prerequisite: Chem 123. Three lectures, one lab. (4F, W, Sp, Su) **Staff**

333. (123) Organic Chemistry. A continuation of Chem 331 and 332 for Chemistry majors and others desiring an intensive lecture course in organic chemistry. Prerequisite: Chem 332. Three lectures. (3Sp) **Staff**

334. (123A) Organic Chemistry Laboratory. Laboratory to accompany Chem 333. Two labs. (2Sp) **Staff**

360. (115) Quantitative Analysis. Basic theory and laboratory practice in gravimetric and volumetric analysis. Prerequisites: Chem 123, Math 105. Two lectures, two labs. (4F)
Cannon

370. (180) Elementary Biochemistry. A brief survey of the chemistry of biologically important compounds such as carbohydrates, lipids, proteins, nucleic acids and enzymes including their role in animal and plant metabolism. Qualitative and semi-quantitative experiments with important compounds are performed. This is a terminal course normally not intended to meet requirements for more advanced work in Bio-chemistry. Prerequisites: Chem 123, 331. Four lectures, one lab. (5Sp)
Burnham, Farley, Emery

490. (160) Undergraduate Seminar. (1W)
Staff

498. (198) Undergraduate Research Problems. Credit arranged. (F, W, Sp) **Staff**

499. (199) Undergraduate Thesis. (1F, 1W, 1Sp) **Staff**

533. (116) Inorganic Preparations. A laboratory course in practical methods of synthetic inorganic chemistry. Prerequisites: Chem 123, 311. **Staff**

552. (150) Inorganic Chemistry. Study of the elements and their compounds with emphasis on periodic relationships. Acid-base and bonding theories and stereochemistry of inorganic compounds. Prerequisite: Chem 306. Four lectures. (4Sp) **J. Morse, K. Morse**

564. (153) Instrumental Analysis. Theory and application of physio-chemical methods of analysis. Selected electrochemical and optical methods. Prerequisites: Chem 308, 360.
Spence

670. (190) Principles of Biochemistry. A study of the chemical and physical behavior of biologically important compounds including the chemistry of carbohydrates, lipids, proteins and hormones with an introduction to enzymatic processes, bioenergetics and metabolism. Prerequisites: Chem 301 or 308 and 332. Four lecturers, one lab. (5F)
Burnham, Farley, Emery

671, 672. (191, 192) Principles of Biochemistry. Chemistry of life processes including acid-base phenomena, enzyme-catalyzed reactions, bioenergetics, oxidation-reduction, biosynthetic phenomena, and the metabolism of biologically important compounds. Prerequisite: Chem 670. Students completing Chem 370 may register with special permission. Three lectures. (3W, 3Sp) **Burnham, Farley, Emery**

673, 674. (193, 194) Biochemistry Laboratory. Laboratory experiments illustrating general principles in studying biological materials. To accompany Chem 671 and 672. Prerequisite: Chem 670 (or special permission), Chem 360 advisable. Two labs. (2W, 2Sp)
Burnham, Farley, Emery

Graduate

601. (201) Quantum Chemistry. Elementary quantum mechanics applied to chemical problems; barrier problems, harmonic oscillator, hydrogen atom, angular momentum, spin, theory of atoms and molecules. Prerequisites: Chem 308, Math 324. Three lectures. (3F)
Alger, Moore, Sinclair

602. (202) Molecular Spectroscopy and Structure. Molecular electronic structure, introduction to infrared, ultraviolet, Raman and magnetic resonance spectroscopies. Prerequisite: Chem 601. Three lectures. (3W)
Alger, Moore, Sinclair

603. (203) Chemical Kinetics. Theory of reaction rates with application to current research problems. Prerequisite: Chem 601. Three lectures. (3Sp) **Alger, Moore, Sinclair**

625, 626, 627. (225, 226, 227) Advanced Organic Chemistry. Mechanism, structure and synthesis in organic chemistry. Prerequisites: Chem 308, 333. Three lectures.
(3F, 3W, 3Sp) **Anderson, Olsen, Smith**

650. (250) Advanced Inorganic Chemistry. Modern topics and theories in inorganic chemistry. Prerequisites: Chem 308, 552. Three lectures. (3W) **J. Morse, K. Morse**

****651. (251) Coordination Chemistry.** Study of bonding, structure, and reactivity of compounds with "coordinate covalent" bonds especially of transition metals. Prerequisite: Chem 650. Three lectures. (3Sp) **J. Morse, K. Morse**

662. (272) Advanced Analytical Chemistry. Prerequisites: Chem 308, 564. Three lectures. (3Sp) **Spence**

675. (286) Advanced Biochemical Research Techniques. Prerequisite: Chem 674. Two labs. Credit arranged. **Staff**

***676. (287) Nucleic Acids and Proteins.** Physical chemistry of macromolecules. Structures of nucleic acids, proteins, and viruses. The regulation of biological activity to structure. Prerequisites: Chem 308, 672. Three lectures. (3W) **Staff**

****701. (204) Chemical Thermodynamics and Statistical Mechanics.** From the standpoint of Gibbs. Prerequisites: Chem 308, 324. Three lectures. (3F) **Staff**

****702. (205) Chemical Thermodynamics and Statistical Mechanics.** Prerequisites: Chem 601, 701. Three lectures. (3W) **Staff**

705. Atmospheric Chemistry and Photochemistry. To provide the principles that will enable a student to understand the chemistry and photochemistry of the atmosphere. (3W) **Moore**

709. (209) Special Topics in Physical Chemistry. Prerequisites: Chem 603, Math 324. (3). **Staff**

728. (228) Physical Organic Chemistry. Quantitative aspects of organic theory including kinetics and equilibrium studies. Prerequisites: Chem 601, 626. Three lectures. (3W) **Anderson, Olsen, Smith**

729. (229) Theoretical Organic Chemistry. Application of kinetics, thermodynamics and simple quantum mechanics to problems of organic chemistry. Prerequisite: Chem 728. Three lectures. (3Sp) **Smith**

****730. (234) Chemistry of Natural Products.** Alkaloids, steroids and terpenes with emphasis on biosynthesis. Prerequisite: Chem 627. Three lectures. (3F) **Staff**

****731. (new) Heterocyclic Compounds.** A survey of the chemistry of aromatic heterocyclic substances, with emphasis on structure and reactivity. Prerequisite: Chem 627. Three lectures. (3F) **Anderson**

***733. (233) Special Topics in Organic Chemistry.** Current topics in organic chemistry. Prerequisite: Chem 627. Three lectures. (3F) **Anderson**

764. (274) Special Topics in Analytical Chemistry. Prerequisites: Chem 308, 564. (3) **Staff**

****775. (295) Enzymes.** Enzymes and their functions in plants and animals. Prerequisites: Chem 308, 672. Three lectures. (3W) **Burnham, Farley, Emery**

****776. (296) Enzyme Chemistry Laboratory.** The experimental methods of enzyme chemistry including the purification, assay, and isolation of enzymes followed by a study of their kinetics, activity and other properties. Prerequisites: Chem 308, 674. Two labs. (2W) **Burnham, Farley**

780. (288) Special Topics in Biochemistry. Two lectures. (2) **Staff**

790. (260) Graduate Seminar. (1F, 1W, 1Sp) **Staff**

797. (298) Graduate Research. Credit arranged. (F, W, Sp) **Staff**

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*Taught 1971-72
**Taught 1972-73

*Department of

Civil Engineering

Head: Professor Elliot Rich

Office in Engineering L162

Professors J. M. Bagley, A. Alvin Bishop, W. O. Carter, Cheng Lung Chen, Calvin G. Clyde, William A. Cordon, Irving S. Dunn, Gordon H. Flammer, Joel E. Fletcher, E. J. Middlebrooks, Cleve H. Milligan, Dean F. Peterson, Harold Wilm

Associate Professors Spencer H. Daines, David Hendricks, Daniel H. Hoggan, C. Earl Israelson, Roland W. Jeppson, Norman B. Jones, Fred W. Kiefer, Byron C. Palmer, Kenneth G. Renard, J. Paul Riley, Glen Stringham, Gary Z. Watters

Assistant Professors Vance T. Christiansen, Alan Kartchner, D. B. Porcella, Derle Thorpe

Research Engineers Frank W. Haws, A. Leon Huber, Eugene K. Israelsen

Degrees: Bachelor of Science (BS), Master of Science (MS), Doctor of Philosophy (PhD)

Majors: Materials and Transportation, Water Quality, Structures, Water Resources, Hydrology, Hydraulics and Fluid Mechanics, Soil Mechanics

The Civil Engineering curriculum is accredited by the Engineers' Council for Professional Development.

No other discipline has more impact on the environment than Civil Engineering. Today's civil engineers are trained and educated not only to implement new technology for man's benefit, but also to assure that this progress is compatible with ecological considerations and the environmental needs of the future.

Civil Engineering is the oldest of the engineering professions. It first consisted largely of the surveying and building of roads, but through the years has kept pace with the expansion of scientific knowledge and now extends over a broad area of technology. The civil engineer of today is employed by federal, state, county and city governments in addition to every type of private industry. He may design large buildings and dams, municipal water supply systems, super highways with their intricate interchanges, or structural shapes for ballistic missiles, rocket engines, naval vessels and aircraft. He studies automobile and air traffic problems, air pollution and solid waste problems. He designs and constructs chemical and petroleum processing plants and nuclear power installations. Civil Engineering today is truly a broad and dynamically expanding profession.

The four-year program listed here leads to the Bachelor of Sci-

*In College of Engineering.

ence degree in Civil Engineering. A five-year program is available for students with inadequate background or those desiring to take Military Science, competitive athletics or part-time employment.

Undergraduate Study

Lower Division

Freshman and Sophomore Years Common to All Engineers (See College of Engineering Introduction)

Upper Division

JUNIOR YEAR

Courses	Credits F	W	Sp
Civil Engrg 304, 306, 307	5	4	4
Civil Engrg 350, 351, 328	3	3	3
Civil Engrg 321, 224		3	3
Mech Engrg 330, 311	3	3	
Humanities	5	3	5
Totals	16	16	15

SENIOR YEAR

	F	W	Sp
Civil Engrg 406, 407, 420	4	3	3
Civil Engrg 430, 531, 521	3	3	3
Civil Engrg 442, 443, 444	4	4	3
Civil Engrg 488, 425, Humanities	3	3	3
[1]Technical Electives	3	3	3
Totals	17	16	15

Water Engineering. USU has a long tradition of training and research in the varied and extensive aspects of water resource development and use. It has developed a well-balanced program, expanded and oriented to provide the training needed to cope with impending water problems of this country and of the world. Teaching and research staff and facilities are continually expanding.

The broad scope of Water Resources Engineering is amply provided in a rich offering of "water" courses in the College of Engineering. Through interdisciplinary collaboration many excellent course offerings are available in other colleges. A long and continuing tradition of international collaboration in water resource work gives breadth and flavor to the overall program.

Hydraulic Engineering at USU encompasses the theory of fluid mechanics and its application in a variety of engineering fields. A good variety and balance of courses in theoretical fluid mechanics and hydraulic design are available at the upper division and graduate levels. Fluid mechanics, based on universally valid theorems of energy and momentum, and recognizing no arbitrary boundaries between fields of engineering knowledge, forms a logical core for the Water Engineering program. Various specialties in Water Engineering draw heavily on the fundamentals of fluid mechanics in the solution of hydrology, irrigation, drainage, municipal water and sewerage, and other hydraulic design problems.

Hydrology and Water Resources Engineering is a fundamental discipline which provides the underpinning for the orderly and unified solution of most water problems.

This hydrologic foundation must be translated into policies, plans, and procedures for optimum development and utilization of the available water supply. Hydrologic considerations must be blended with a substantial body of other engineering, economic, legal, and social informa-

[1]Technical electives may be selected from upper division or graduate courses in any Engineering department, Mathematics, Applied Statistics, Geology, Business Administration, etc., with the adviser's approval.

tion in the formulation of comprehensive multiple-purpose plans.

Water Quality Engineering. Within the hydrologic cycle, a relatively fixed supply of water is available for beneficial use. Today's demands for water exceed this available supply. Tomorrow's ever-increasing demands indicate that multiple reuse of water is inevitable; thus, water quality control considerations become of paramount importance.

The goal of Water Quality Engineering becomes that of altering or upgrading quality to a level appropriate to the intended use. Water quality changes are accomplished by engineered systems, which include a concern for minimum cost consistent with health, safety and product requirements.

Irrigation and Drainage Engineering. See Department of Agricultural and Irrigation Engineering.

Structural Engineering. Bridges, buildings of ordinary and unusual nature, structures for aircraft and space industries and a variety of other purposes, all depend on the structural engineer for their design.

The foundation of Structural Engineering is mathematics, engineering mechanics, mechanics of solids, and properties of materials. This is reinforced with knowledge and experience obtained in design courses.

At a higher level, structural engineers study theoretical and applied mechanics and mathematics as a basis for the analysis and design of complex structural forms.

Soil Mechanics. Engineering studies of soils are concerned with the ability of soils to support structures, roadways and runways, and with the economic application of engineering design to foundations. This science is relatively new, but has developed to a point where no engineer or architect can ignore the problems of investigating properties of soils in connection with engineering construction. Undergraduate and graduate courses offered by the Soil Mechanics Division of Civil Engineering provide the basic knowledge necessary for the design of foundations and acquaint the student with the methods and techniques required to assure safe construction of engineering projects. The program emphasizes fundamental concepts and practical ideas so that the student will be properly trained for his initial job, as well as being prepared to understand future development in this field.

Materials Engineering. Effective utilization of the elements of production, space exploration and civil works, and the expanding demand for more esthetic bridges, buildings, highways, canals, and dams, requires modern engineering materials of increasingly high quality and sophistication. Since materials may represent a large share of the cost of a project, effective and efficient use of materials is of paramount importance.

It is the objective of Materials Engineering to develop effective use of available materials, to take advantage of new knowledge and, through research and development, contribute to the technical knowledge available. The USU staff makes frequent contributions to national and international conferences and publications.

Graduate Study

This department offers the Master of Science degree in most Civil Engineering fields and the Doctor of Philosophy degree in Fluid Mechanics, Soil Mechanics, Water Resources, Hydrology, Water Quality, Hydraulics, and Structures.

Curricula and research leading to an advanced degree either on the master's degree or doctor's degree level are supervised by a graduate committee appointed by the dean of the School of Graduate Studies. Staff members of the major departments serve on these committees. All study and research programs must be approved by such a committee before admittance to candidacy for the advanced degree. The study and research program for a particular degree must also satisfy all of the requirements listed in this catalog under the School of Graduate Studies.

All graduate students who desire to take any graduate level Fluid Mechanics courses must either take Civil Engineering 553 or pass the Fluid Mechanics diagnostic examination. This examination will be given immediately after registration for Fall Quarter and will cover Elementary Fluid Mechanics.

All courses listed above 599 are reserved for graduate students. Undergraduate Senior students who have a high scholastic standing may register for them only with approval of the department.

Civil Engineering Courses

Undergraduate

200. (91) Engineering Mechanics - Statistics. Resultants and equilibrium of force systems, friction, centroids, moments of inertia, method of work. Prerequisites: Gen Engrg 102, Math 222, Physics 221. Three lectures. (3F, W, Sp, Su) **Staff**

202. (92) Engineering Mechanics-Dynamics. Kinematics, force-mass-acceleration, work, and energy, impulse and momentum, and vibrations. Prerequisite: CE 200 (5F, W, Sp, Su) **Staff**

221. (81) Plane Surveying. Primarily for non-Engineering students. Use of tape, hand level, level, transit, compass, and plane table. Differential and profile leveling, traversing, plotting, mapping, and care of engineering instruments. Prerequisites: Algebra and Trigonometry. One lecture, two labs. (3F) **Thorpe**

224. (84) Surveying. Terminology, computations, areas, volumes, field astronomy, and general surveying. Prerequisites: Math 105, 106. Two lectures, one lab. (3Sp) **Thorpe**

225. (85) Advanced Surveying. Problems in leveling, curves, spirals, stadia, plane table, and city surveying. Prerequisite: Civil Engrg 224. One lecture, two labs. (3Sp) **Thorpe**

304. (103) Mechanics of Solids. Stress and strain due to tension, compression, torsion, flexure, shear; introduction to combined stresses, instability, effect of repeated and dynamic loadings and connections. Five lectures. Prerequisite: Civil Engrg 200 (5F, W, Sp) **Staff**

306. (104) Structural Mechanics — Determinate. Prerequisite: CE 304 or equivalent. Three lectures, one lab. (4W) **Carter, Christiansen, Rich**

307. (105) Structural Mechanics — Hyperstatic. Prerequisite: Civil Engrg 306. Three lectures, one lab. (4Sp) **Carter, Christiansen, Rich**

321. (181) Photogrammetry. The science or art of utilizing photographs of the earth's surface for making surveys maps, and land utilization studies. Planimetric maps, mosaic and restituted photographs, their construction and uses. Prerequisites: Mech Engrg 170, Civil Engrg 221 or 224, or Senior standing in Natural Resources, Geology, Landscape Architecture, Aeronautics, or Advanced Military Science. Two lectures, one lab. (3W) **Thorpe**

324. (182) Route Surveying. Theory and practice in highway curves and earth work, including methods used in highway, street, canal, pipe line and general project surveys. One lecture, one lab. (2Sp) **Staff**

328. (128) Engineering Materials. Influence of atomic arrangement, bonding and crystalline structure on the properties of construction materials. The properties, requirements

and uses of engineering materials in modern construction. Three lectures. Lab arranged. (3Sp) **Cordon**

350, 351. (140, 141) Fluid Mechanics. Properties of fluids, principles of hydrostatics, fluid dynamics, principles of similarity, flow of fluids in pipes, measurement of fluid flow. Prerequisites: Math 110; concurrently Gen Engrg 103, Civil Engrg 202. Fall, three lectures; Winter, two lectures and one lab. (3F, 3W) **Clyde, Flammer, Jeppson, Watters**

402. (new) Dynamics, Intermediate. See Mech Engrg 402.

406. (106) Structural Concrete Design. Prerequisite: Civil Engrg 306 or equivalent. Three lectures, one lab. (4F) **Carter, Christiansen**

407. (107) Structural Steel Design. Prerequisite: Civil Engrg 306 or equivalent.. Three lectures. (3W) **Carter**

420. (190) Engineering Economics. Applications of the mathematics of finance to engineering decision making. Prerequisites: Econ 200 or 150, Gen Engrg 103, or instructor's consent. Three lectures. (3Sp) **Cordon**

425. (195) Legal Aspects of Engineering. Synopsis of the law of contracts. Writing of engineering specifications. Engineering ethics. Three lectures. (3W) **Cordon**

430. (150) Soil Mechanics. Elementary physics of soil as applied to engineering problems. Moisture, plasticity, and capillary relationships. Percolation and the design of earth structures and foundations. Prerequisites: Civil Engrg 304, 350. Two lectures, one lab. (3F) **Dunn, Kiefer**

442. (172) Water Resource Engineering — Hydraulics. Uniform and non-uniform open channel flow; channel distribution and collection systems; pipe networks, pumps and pumping systems, pipe-line transients, design considerations. Prerequisite: Civil Engrg 351. Three lectures, one lab. (4F) **Flammer, Jeppson, Watters**

443. (173) Water Resources Engineering — Hydrology. The hydrologic cycle, including weather elements and climate, precipitation, evaporation, transpiration, infiltration, ground water, and run-off methods of collection of hydrologic data. Prerequisite: Civil Engrg 351, or instructor's consent. Three lectures, one lab. (4W) **Milligan, Riley**

444. (174) Water Resource Engineering — Quality. Water quality requirements for beneficial uses (including municipal, industrial and agricultural); quality changes resulting from beneficial use, and engineering methods of treatment and pollution control. Prerequisite: Civil Engrg 351 or instructor's consent. Three lectures. (3Sp) **Jones**

487. (198) Senior Seminar. Written and oral expression. Three lectures. (3F) **Cordon, Rich**

493. (199) Independent Study. A laboratory design or a research project on a problem selected by the student. It requires a review of literature, preparation of a proposal which describes the project, and the completion of a design or research and the preparation of a report. May be submitted for a required senior technical elective on recommendation of the adviser. (3F, W, Sp, Su) **Staff**

497. (197) Honors Studies. Advanced work for qualified students, initiated by a student and may consist of a special individual project under the direction of a faculty member, or of advanced study in connection with an established departmental course. Prerequisite: A satisfactory grade point average, recommendation of instructor and approval of the College of Engineering Honors Committee. (1-3F, W, S) **Staff**

500. (130) Construction Cost Estimating. Introduction to construction contracting, methods of preparing cost estimates, including an introduction to the Critical Path Method of planning and scheduling construction projects. Prerequisite: Instructor's consent. (3F) **Christiansen**

502. (new) Mechanical Vibrations. See Mech Engrg 502.

504. (new) Mechanics of Solids, Intermediate. See Mech Engrg 504.

506. (203) Limit Analysis of Structures. Limit concepts applied to analysis of frame and plate structures; collapse loads, deflections, connections, secondary effects. Three lectures. (3Sp) **Carter**

508. (108) Structural Synthesis and Design. Structural synthesis involving the selection and evaluation of alternate structural systems for selected multipurpose structures. Three lectures. (3Sp) **Carter**

509. (109) Computer Structural Analysis. Prerequisite: Civil Engrg 307. Three lectures. (3F) **Carter**

520. (120) Highway Engineering. Highway systems, planning, economy, finance, location, plans, rights of way, geometric design and roadside development. Prerequisites: Civil Engrg 224 or 221, Senior standing or instructor's consent. Three lectures. (3F) **Cordon**

521. (121) Highway Engineering. Highway drainage, subgrade structure, base courses, bituminous and Portland-cement concrete pavements and maintenance. Prerequisite: Civil Engrg 430. Three lectures. (3W) **Kiefer**

522. (122) Traffic Engineering. Street and highway traffic problems; principles of design and planning of thoroughfares based on operational characteristics; traffic control and regulation. Three lectures. (3W) **Thorpe**

527. (127) City Planning. Master plans, civic units, parks and playgrounds, utilities, housing, subdivisions, zoning, civic centers and airports. Prerequisite: Civil Engrg 520. Two lectures, one lab. (3Sp) **Staff**

531. (151) Soils Engineering. Application of engineering soil mechanics and structural theory to the design of foundations, dams, highways, and other engineering problems. Prerequisite: Civil Engrg 430 or equivalent. Three lectures. (3W) **Dunn, Kiefer**

532. (152) Foundation Analysis and Design. Engineering properties of soils and their effect on the design of footings, pile foundations, cofferdams, caissons, mat foundations and retaining walls. (3Sp) **Dunn, Kiefer**

550. (137) Applied Hydraulics. An applied course primarily for non-engineering students who need some knowledge of hydraulics. Subjects covered are: fluid statics and dynamics, flow in pipes and open channels, flow measurement. Prerequisites: Minimum five credits of college physics, Math 221, knowledge of use of slide rule. Three lectures, one lab. (4F) **Watters**

553. (143) Fluid Mechanics and Hydraulics. Preparatory course for graduate students majoring in Fluid Mechanics or Irrigation who show inadequate preparation in this area. Subject matter of Civil Engrg 350, 351, 442 will be covered. This course not accepted as graduate credit in Fluid Mechanics or Irrigation Engineering major. Four lectures. (4F) **Watters**

560. (new) Aquatic Microbiology. See Bacteriology 560.

561. (191) Water Quality Analysis. Chemistry of water and waste waters. Principles of solution chemistry with application to water treatment and utilization, waste-water treatment processes, and transformations in natural waters. Prerequisite: Chemistry 301. Three lectures, one lab. (4W) **Jurinak, Porcella**

Graduate

600. (201) Structural Optimization. Linear and non-linear programming with application to structural optimization. Three lectures. (3F) **Rich**

601. (202) Structural Matrix Analysis. Application of matrix methods to equilibrium and stability analysis of hyperstatic structural systems. Prerequisites: Computer Science 380, Civil Engrg 509 or equivalent recommended. Three lectures. (3W) **Carter**

602. (new) Mechanical Vibrations, Advanced. See Mech Engrg 602.

604. (new) Continuum Mechanics. See Mech Engrg 604.

605. (new) Elastic Theory. See Mech Engrg 606.

608. (207) Elastic Stability. Buckling of columns; analysis of beam-columns, thin-walled beams of open cross-section. Stability analysis of frame and plate structures. Three lectures. (3F) **Carter, Christiansen, Rich**

609. (260) Similitude. The principles of similitude are developed and used to design the research projects dealing with physical phenomenon. General techniques presented for experiments based on prototype studies, model studies and analogies in solid mechanics and fluid mechanics. Prerequisite: Instructor's consent. (3F) **Flammer, Watkins**

620. (220) Asphalts and Asphalt Mixtures. The production, classification, physical and chemical properties, and uses of asphalts. Asphalt paving mixtures — properties, designing, construction and performance. Prerequisite: Instructor's consent. Three lectures (3W) **Jones**

621. (221) Pavement Design. Theories, principles and practices in the design of highway and airport pavements; includes soil stabilization, base courses and bituminous and Portland-cement concrete pavements. Prerequisite: Civil Engrg 620. Three lectures. (3Sp) **Jones, Cordon**

622. (222) Highway Planning and Economics. Economics of location and design, selection, improvement and maintenance, traffic control, administration and finance, and jurisdiction as applied to highways. Prerequisite: Civil Engrg 520. Three lectures. (3F) **Cordon**

628. (228) Concrete Engineering. Basic properties of concrete and concrete materials, including the study of admixtures and pozzolans. Significance of tests and analysis of acceptance tests, performance tests, and control tests. Concrete as a construction material. Prerequisite: Civil Engrg 328 or equivalent. (3W) **Cordon**

630. (210) Earth and Rock Fill Dams. Design of flexible type (earth or rock-fill) dams, utilizing naturally available materials. Theories of soil mechanics are used to check designs against criteria for structural stability and stability against seepage. Attention given to foundations and construction details. Prerequisite: Civil Engrg 430. (3F) **Kiefer, Milligan**

631. (211) Masonry Dams. Design of rigid type dams. Stress analysis and design of

gravity, multiple arch, and deck types of masonry dams, timbers, steel, and miscellaneous types. Prerequisite: Civil Engrg 304. (3W) **Staff**

633. (250) Soil Mechanics. Theories of seepage, capillarity, stress, consolidation, and stability are developed and applied to the practical design and construction of earth structures. Interpretation of laboratory tests is given special attention. Prerequisite: Civil Engrg 430 or its equivalent. (3Sp) **Dunn**

634. (251) Soil Mechanics Laboratory. Prerequisites: Civil Engrg 430 and 633 (or take concurrently). (1Sp) **Kiefer**

635. (new) Transport Phenomena. See Mech Engrg 635.

640. (266) Hydrologic Methods. Application of mathematical, statistical and graphical techniques to the analysis of hydrologic and climatologic elements. Frequency analysis, spacial comparisons and correlations, extending records, harmonic analysis, curve fitting and smoothing computational aids. Prerequisites: Civil Engrg 443 and a knowledge of the fundamentals of statistics. Three lectures. (9F) **Fletcher**

641. (267) Flood Hydrology. Procedures of estimating run-off from rainfall and snowmelt, run-off hydrograph analyses and synthesis considering parameters such as infiltration, loss rates, time of concentration and lag, unit hydrograph concepts, storage and flood routing, and control methods. Prerequisite: Civil Engrg 640. Three lectures. (3W) **Fletcher, Hoggan**

642. (268) Groundwater Hydrology. Properties affecting storage and movement; field determination and transmissibility and storage coefficient; ground water basin development and management; ground water inventory; safe yield concept; ground water recharge and withdrawal; economic, legal and physical considerations; maintenance of ground water quality, planned utilization and conjunctive use. Prerequisite: Civil Engrg 443. Three lectures. (3Sp) **Clyde, Hoggan, Riley**

646. (275) Snow Pack Management. See Watershed Science 717.

647. (276) Snow Hydrology. Study of the fundamental phenomena affecting snow accumulation, distribution, melt, and a subsequent runoff process. The measurement and characteristics of these processes and their incorporation into a basic model of the entire flow system involved in snow hydrology will be included. Three lectures. (3Sp) **Fletcher**

650. (212) Appurtenances to Dams and Operation of Reservoirs. Hydraulic and structural design of tunnels, gates, outlet channels, trash racks, etc. Operation of reservoirs for flood control and irrigation. Prerequisite: Civil Engrg 442. (3Sp) **Staff**

651. (215) Hydraulic Transients. Unsteady flow in closed conduits, pipe line surges, water hammer, pulsating flow; unsteady channel flow, channel surges, flood waves. Prerequisites: Civil Engrg 442, Computer Science 380, or instructor's consent. (3W) **Watters**

652. (243) Hydraulic Design. Design of pumping systems, including transient control devices; design and operation of open channel conveyance systems. Prerequisites: Civil Engrg 442, 650. (3Sp) **Watters**

*__653. (240) Fluid Mechanics Lab Instrumentation.__ Experimental investigation of fluid flow phenomena. Design and development of modern laboratory equipment and instrumentation. Prerequisite: Civil Engrg 351 or 553. (2-4F) **Clyde**

655. (242) Open Channel Flow. Theory of uniform and varied flow in open channels and its application to the analysis and design of open channels and open channel control structures for both subcritical and supercritical flow. Prerequisites: Computer Science 380, Civil Engrg 553 or Diagnostic Exam. Three lectures, one lab. (4W) **Flammer, Jeppson**

656. (255) Sediment Transport and Alluvial Channel Flow. Sedimentation problems, sediment transport, channel roughness and design of stable channels. Three lectures, one lab. (4Sp) **Bishop, Flammer**

658. (241) Fluid Mechanics — Intermediate. Nature of the fluid state, coordinate systems and fluid motion. Navier-Stokes equations, exact and approximate solutions, introduction to potential flow theory, graphical flow nets, boundary layers, turbulence, fluid lift and drag, unsteady flow. Prerequisite: Civil Engrg 553 or Diagnostic Exam. (4W) **Clyde**

664, 665, 666. (294, 295, 296) Water and Waste Water Treatment. Prerequisite: Instructor's consent. (3F, 3W, 3Sp) **Jones, Middlebrooks, Porcella**

667. (297) Industrial Waste Waters. Nature of important water-using industrial processes, along with theory, design and application of appropriate unit treatment processes and operations for achieving water pollution control and abatement objectives. Prerequisite: Civil Engrg 665. One lecture, one lab. (2Sp) **Middlebrooks, Porcella**

680. (299) Graduate Seminar. (1F, W, Sp) **Staff**

690. (265) Directed Reading and Special Studies in Civil Engineering. Investigations into topics of special interest in fluid mechanics, hydrology, water resources, irrigation, structures, highways, soil mechanics or other

*Taught 1971-72.

Civil Engineering specialty. Discussion periods. A final report or examination is required. Prerequisite: Instructor's consent. Credit arranged. (F, W, Sp, Su) **Staff**

693. (273) Special Problems in Civil Engineering. Independent or group study of engineering problems not covered in regular course offerings. Time and credit arranged. (F, W, Sp, Su) **Staff**

697, 698. (new) Thesis Research, Research Consultation. Credit arranged. (F, W, Sp, Su) **Staff**

699. (400) Continuing Registration. Time and credit arranged. (F, W, Sp, Su) **Staff**

702. (new) Mechanical Vibrations, Advanced. See Mech Engrg 702.

705. (new) Elastic Theory. See Mech Engrg 705.

708. (208) Plate Theory. Analysis of circular, rectangular, and continuous plates by classical and numerical methods. Prerequisites: Civil Engrg or equivalent, Advanced Mathematics. Three lectures. (3W) **Carter, Christiansen, Rich**

709. (209) Shell Theory. Analysis of cylindrical shells, shells of revolution, and shells of complex curvature by classical and numerical methods. Prerequisite: Civil Engrg 708. Three lectures. (3Sp) **Carter, Christiansen, Rich**

742. (262) Water Resources-Engineering-Systems. Relationship of development of water resources to development of other natural resources. Historical and present concepts in water development. Prerequisite: Instructor's consent. (3F) **Hoggan, Milligan**

743. (263) Water Resources-Engineering-Institutions. Current problems and policies on water resource allocation and administration. Institutional factors, and coordinating mechanisms, state and federal role in water resource development. Prerequisite: Instructor's consent. (3W) **Hoggan, Milligan**

744. (264) Water Resources-Engineering-Planning. General principles and procedures of water resource planning within a regional, multipurpose context, considerations of project formulation, alternative plans, socio-economic analysis and financing. Prerequisite: Instructor's consent. (3Sp) **Hoggan, Milligan**

752. (246) Porous Media Flow. Application of mathematical theory to flows in porous media. Topics include: Darcy's law, velocity potential, stream function, Dupuit flows, complex function theory and transformations applied to seepage flows, and unsteady flows. Prerequisites: Civil Engrg 351, 553, Math 442. (3Sp) **Jeppson, Watters**

753. (new) Numerical Methods in Engineering. Finite difference methods for solving partial differential equations are applied to fluid flow, seepage and other engineering problems. Transformations are discussed which permit straight forward solutions to both fixed boundary and free-surface problems. Techniques adapted to digital computers are stressed. Prerequisites: Civil Engrg 658, Computer Science 380, or instructor's consent. Three lectures. (3Sp) **Jeppson**

757. (270) Fluid Mechanics-Advanced. Application of the principles and methods of classical hydrodynamics to the solution of fluid flow problems. Prerequisites: Civil Engrg 658 and Advanced Calculus or Advanced Engineering Mathematics. (3F) **Flammer, Jeppson**

758. (271) Fluid Mechanics-Advanced. Linear and non-linear theory of water waves, jets, selected topics from free-surface hydrodynamics. Prerequisite: Civil Engrg 757. (3W) **Watters**

759. (272) Fluid Mechanics-Advanced. Turbulence and boundary layers. Prerequisite: Civil Engrg 757. (3Sp) **Clyde**

761. (293) Water Quality Management. Natural and man-made characteristics of water quality, water quality requirements for beneficial uses and discharge to receiving waters, and elements of technology available for water quality management. Prerequisite: Instructor's consent. (3F) **Jones**

762. (292) Air Quality Management. Classifications of air pollutants and their sources, air quality standards, atmospheric sampling and analysis, technical approaches to control, regulatory measures and selected topics in meteorological and biological effects. Prerequisite: Instructor's consent. (3W) **A. Kartchner**

763. (291) Solid Waste Management. Nature and scope of the solid waste disposal problem, the general state of the art, and management solutions based on social, economic and tech-considerations. Prerequisite: Instructor's consent. Three lectures. (3Sp) **Jones**

780. (299) Graduate Seminar. (1F, W, Sp) **Staff**

797, 798. (298) Dissertation Research, Research Consultation. Credit arranged. (F, W, Sp, Su) **Staff**

799. (400) Continuing Registration. Time and credit arranged. (F, W, Sp, Su) **Staff**

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*Taught 1971-72.

*Department of

Clothing and Textiles

Acting Head: Professor Phyllis R. Snow

Office in Family Life 303

Associate Professors Ruth E. Hawthorne, Theta Johnson

Assistant Professor Virginia Lewis

Instructors Jean M. Alder, Ruth V. Clayton, Russell J. Fjeldsted, Anna L. Langford, Barbara O. White

Degrees: Bachelor of Science (BS), Bachelor of Arts (BA), Master of Science (MS)

Major: Clothing and Textiles. Two options: General Clothing and Textiles, and Fashion Design and Merchandising

Individuals who complete the major in Clothing and Textiles may find personal satisfaction in the ability to produce quality garments with original styling not available in ready-to-wear, and in being knowledgeable consumers.

Manufacturers, designers, and retailers of clothing want graduates, men and women, who have a flare for clothes, who understand the market place and the total apparel and textile industry, and who contribute to sales that result in consumer satisfaction as well as profit. Ability to construct clothes, though desirable, is not as essential as ingenuity and the ability to interpret and coordinate ideas.

The major should be supported by a minor in Social Science, Art, Journalism, Business, or General Family Life. Experience in business is strongly recommended if the design and merchandising option is selection.

*In College of Family Life.

Undergraduate Study

The general major provides preparation leading to positions with pattern companies, textile producers, retail business firms, or apparel manufacturers; with women's magazines advertising or promotion firms, and news media; or as designer or seamstress in a custom dress-making establishment.

The Fashion Design and Merchandising option leads to positions in manufacturing and retailing such as buyer or assistant buyer, comparison shopper, fashion stylist or coordinator, merchandise manager, fashion market reporter, fashion promoter, or owner-manager of a small store. Either design or merchandising may be emphasized. Work within the department will be similar with the supporting minor indicating the desired emphasis. A minor in Art is suggested for Fashion Design, and a minor in Business Administration for Fashion Merchandising. Experience in busi-

ness is strongly recommended for either emphasis.

Courses Required for All Options

		Credits
CT 105	Design in Everyday Living	3
CT 110	Basic Fitting and Clothing Construction	3
CT 224	Introduction to Textiles	3
CT 306	Behavioral Aspects of Clothing	3
CT 320	Comparative Const. Technology	5
CT 335	History of Costume and Textiles	5
CT 486	Fashion Analysis	3
CT 491	Seminar	2

Additional courses to complete the chosen option will need to be selected in consultation with the adviser.

Clothing and Textiles Minor. Students wishing a minor in Clothing and Textiles should take Clothing and Textiles 105, 110, 224, 306, and six credits selected from other courses included in the Clothing and Textiles major.

Graduate Study

The department offers the master's degree. Departmental research emphasizes the behavioral science aspects of Clothing and Textiles. Individual programs will be designed in accordance with the background and interests of each candidate.

Clothing and Textiles Courses

Undergraduate

105. (5) Design in Everyday Living. Principles of design and color as related to the individual, the home and family living. (3F, W, Sp) **White**

110. (10) Basic Fitting and Clothing Construction. Application of principles of fitting, alteration, and construction to the use of commercial patterns. (3F, W, Sp) **Hawthorne, Langford, Lewis**

115. (15) Clothing Selection for Men. Fundamentals of fabric and garment selection. (2F, W, Sp) **Fjeldsted**

224. (24) Introduction to Textiles. A study of fibers, yarns, fabric construction and finishes as related to the appreciation, selection, use, and care of current textiles. (3F, W, Sp) **Staff**

275. (75) Home Furnishings. Characteristics of home furnishings in relation to their classification, design, respective quality, use and care. Local field trips. (3F, W, Sp) **Lewis**

306. (106) Behavioral Science Aspects of Clothing. Application of concepts from cultural anthropology, economics, psychology, and sociology to the study of clothing and personal appearance. Prerequisite: a sociology or psychology course. (3F, W, Sp) **Hawthorne**

***314. (114) Fashion Sketching.** Instruction to drawing fashion figures; transition from the natural figure to fashion figure types. Instruction in clothing the figure, and use of techniques for quick and realistic sketching of materials for the professional field of designing and fashion merchandising. (3F) **Staff**

315. (115) Fashion Design. Designing for reproduction, considering the wearer, the fabric, and the ensemble. Clothing selection for women as to attractiveness, and appropriateness. Sources of inspiration for fashion designing. Individual experimentation through sketching with application directly to fabrics. (3W) **Lewis**

320. (120) Comparative Construction Techniques. Development of judgment, originality, and skill in clothing construction with emphasis on alternative techniques and intricate construction details. Prerequisite: CT 110. (5F, W, Sp) **Lewis**

335. (135) History of Costume and Textiles. A survey of costume and textile development from ancient times to the present as related to the socio-economic, cultural, and political influences of the times. (5F) **Clayton**

****440. (140) Draping.** Theory and technique of pattern development on the full-scale, three-dimensional form. Application of principles of straight grain draping and a problem-solving approach to the production of two designs. Prerequisite: CT 320 or instructor's consent. (3F) **Hawthorne**

***470. (170) Flat Pattern.** Emphasis on the slash and spread method. Application of principles in half-scale, refinements of individual sloper, and two full-scale designs. Prerequisite: CT 320 or instructor's consent. (3F) **Hawthorne**

474. (174) Advanced Textile Problems. Fiber identification of standard testing procedures and use of physical testing equipment. Prerequisite: CT 224. Recommended: Chemistry 111, 112, 141. **Staff**

480. (180) Tailoring. Application of traditional tailoring techniques in the construction of custom-tailored suits and coats. Prerequisite: CT 110. Recommended: CT 320, 470. (3W) **Clayton**

486. (186) Fashion Analysis. An overview of the structure and organization of the field of fashion: design, production, distribution, and promotion. Persons, organizations and products that are significant to the field. (3Sp) **Hawthorne**

490. (190) Independent Study. Credit arranged. (F, W, Sp, Su) **Staff**

491. (191) Seminar: Readings. (2Sp) **Hawthorne**

492. (192) Field Experience in Clothing and Textiles. Provides practical experience with fashion retail and design firms in the Utah area. Students work under the direction of a manager of an approved firm. A University supervisor will direct the program and meet periodically with students on a seminar basis. (F, W, Sp, Su) **Fjeldsted, Lewis**

495. (195) Couturier Design. Integration of design methods and construction techniques in the execution of a garment with an original design. Emphasis on adding to the student's personal portfolio. Prerequisites: CT 224, 320, 440, 470, 480, 314, 315. **Clayton**

497. (197) Honors Studies. See Family Life 397. Credit arranged. (F, W, Sp, Su) **Staff**

Graduate

604. (204) Economics of Clothing and Textiles. Analysis of related industries from an economic viewpoint, trends in production, distribution, and consumption of textiles and apparel. Recommended: Basic Economics course. (3Sp) **Langford**

606. (206) Advanced Behavioral Science Concepts in Clothing. Application of concepts from cultural anthropology, sociology, and psychology to the study of clothing and appearance. Readings and discussion of pertinent theory and empirical findings. (3F) **Hawthorne**

608. (208) Cultural Bases of Clothing. Prerequisite: CT 606. (3W) **Hawthorne**

680. (293) Research Methods. See Family Life 680. (3F) **Schvaneveldt**

690. (290) Independent Study. Credit arranged. (F, W, Sp, Su) **Staff**

691. (191) Graduate Seminar: Current and Special Topics. (2Sp) **Hawthorne**

694. (294) Research Colloquium. Discussion of hypothesis, methodologies, and findings in clothing and textiles research. Analyses of dissertations and other on-going projects. (1F, W, Sp) **Hawthorne**

697. (295) Research and thesis. Credit arranged. (F, W, Sp, Su) **Staff**

699. (400) Continuing Registration. Credit arranged. (F, W, Sp, Su) **Staff**

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*Taught 1971-72

**Taught 1972-73

*Department of

Communicative Disorders

Head: **Professor** Jay R. Jensen

Office in Mechanical Arts 202

Associate Professors Frederick S. Berg, Richard D. Taylor

Assistant Professors Thomas C. Clark, Thomas S. Johnson, Steven H. Viehweg

Instructors James C. Blair, Lila Jaclyn Littledike

Degrees: Bachelor of Science (BS), Master of Science (MS)

Majors: Clinical Audiology, Educational Audiology, Speech Pathology

The Department of Communicative Disorders has three major purposes: 1) training of clinically competent specialists within the three majors; 2) service to the University population and to the community for individuals handicapped by speech and/or hearing disorders; 3) research to provide an opportunity for both staff and students to participate in significant investigative experience.

Though the Bachelor of Science degree is available in the department, the Master of Science degree is required for professional certification in an increasing number of states and is the degree demanded for national certification and membership in the American Speech and Hearing Association. The three clinical areas all require preparation beyond the bachelor's degree for the student to become professionally prepared and to obtain a certificate of competence.

The Department of Communicative Disorders is located in the Mechanical Arts Building and has a complete diagnostic and treatment center there. The center provides a service to the community but is used principally as a clinical laboratory for the students. Eight sound-treated therapy rooms are utilized both for training and service. Two sound-treated audiometric suites are available for the assessment of hearing disorders, and a communication laboratory is available for extensive experimental and instrumental research programs.

Many off-campus facilities are used for the clinical and research endeavors of the department. Local public school districts, schools for the deaf, state agencies and facilities, and federal agencies and facilities are all involved in departmental programs.

Undergraduate Study

Clinical Audiology. The student may elect to complete an undergraduate major in Clinical Audiology during four years. Certification as a public school audiologist by the State of Utah or the Certificate of Clinical Competence awarded by the American Speech and Hearing Assocation requires an additional year of study beyond the bachelor's degree. The general lower division requirements must be completed. The Audiology major requires 40-50

*In College of Education.

credits of professional preparation in the department as specified by the adviser.

Educational Audiology. A major in Educational Audiology may be completed during four years. However, certification as a teacher of the hearing impaired will require a fifth year of study. University lower division requirements must be completed. The Educational Audiology major requires 40-50 credits of departmental specialization as prescribed by the adviser.

Speech Pathology. The student may complete an undergraduate major in Speech Pathology during four years. However, to become clinically certified by either the State of Utah or by the American Speech and Hearing Association, additional post-graduate credit must be obtained during a fifth year of study. The program requires completion of general University lower division requirements with advisement as to which courses available as group fillers are best suited for Speech Pathology majors. The major requires 40-50 credits of professional preparation from among the courses offered in the department as specified by the adviser.

All graduating Seniors will be required to take a comprehensive examination in their Senior year. This examination will cover pertinent material relevant to professional skills in the major area.

Minor in Communicative Disorders. A minor is available within the department. However, a student who has a minor in this area is in no way certifiable as a speech clinician, audiologist, or teacher of the hearing impaired. The minor consists of a core curriculum common to all the majors, but does not equip the student to perform professional services in the area. The following courses are required for a departmental minor: CD 115, 170, 175, 310.

Graduate Study

The Department of Communicative Disorders offers a Master of Science degree in Clinical Audiology, Educational Audiology, or Speech Pathology. The undergraduate requirements or their equivalent must be filled before a student begins his graduate program. The graduate program prepares a student for professional employment in the area of specialization. The student should consult the USU Graduate Catalog for detailed regulations governing graduate education.

Financial aid for graduate students is available through assistantships, scholarships, undergraduate and summer traineeships, and fellowships. The various supports are offered on a competitive basis depending upon grade point average, need, and recommendations from the institution of higher education in which undergraduate work was conducted.

Communicative Disorders Courses

Undergraduate

10. (10) Remediation of Communicative Disorders. For students with communicative problems for which speech and/or hearing therapy is needed. No credit. (F, W, Sp)
Staff

100. (100) Introduction to Communicative Disorders. Survey of speech, language and auditory factors conducive to normal and abnormal speech development in the child. Course includes directed observations in the USU Speech and Hearing Center. Recommended for prospective elementary school teachers. (5F, W, Sp)
Staff

105. (105) Speech Improvement for the Classroom Teacher. Designed to provide the teacher with techniques to improve the listening, sound discrimination and production skills of children in the elementary grades. (3F, Su)
Littledike

115. (115) Fundamentals of Communicative Science. Consideration given to the biological elements of sound production and manipulation, the physics and psycho-physics of sound, and the phonological principles and processes whereby sounds are combined into meaningful patterns. Laboratory demonstrations and applications are included. (5W) **Viehweg**

140. (40) Apprenticeship in Communicative Disorders. Observation of clients in the Speech and Hearing Center. Some participation with the senior clinician. Emphasis placed on observational techniques and methods utilized in therapeutic procedures. (1F, W, Sp) **Johnson**

170. (70) Language, Hearing and Speech Development. Some consideration given to disorders which may arise in these developmental processes. (3W, Su) **Jensen**

175. (90) Phonetics. An analysis of the phonetic and phonatory aspects of speech. (3F, Su) **Berg**

304. (104) Speech for the Hearing Impaired. Acoustic and spectrographic identification of the speech of individuals with varying hearing impairments; principles, techniques, devices and equipment for developing and correcting the speech of the hearing-impaired; case studies. (3F) **Berg**

307. (107) Basic Audiometry. Psycho-physical methods and psycho-acoustics; the role of hearing in the biological scheme, the history of the development of audiology, measurement principles and scales, psycho-physical measurement techniques, the absolute auditory threshold including normative data; audiometric techniques including pure tone air and bone conduction testing, masking, audiometric screen, tuning fork tests and case history techniques. (5Sp) **Viehweg**

310. (110) Fundamentals of Anatomy for Speech and Hearing. Emphasis given to developmental considerations. (5F) **Johnson**

311. (111) Disorders of Articulation. Introduction to articulation disorders and related problems. Study will be directed as examination of oral peripheral structures, analysis of articulatory proficiency, treatment methods for articulatory disorders, analysis and treatment of abnormal swallow patterns. (5Sp) **Jensen**

314. (114) Language Disorders and Hearing Impairment. A study of natural language development and the effect of a hearing loss. This development, a study of current theories concerning language perception, cognition, etc. Specific language problems of the hearing impaired and the diagnosis of these problems. Language programs for pre-school and elementary hard-of-hearing children. (3F) **Clark**

317. (117) Speech Audiometry. Introduction to speech audiometric practices and procedures. Emphasis on the rationale, development, administration, and interpretation of threshold and supra-threshold tests for medical and post-medical rehabilitation. Prerequisite: CID 307. (3F) **Taylor**

321. (121) Therapeutic Methods in Speech Pathology. Appropriate and effective methods of speech therapy. Therapeutic models, behavioral management techniques, the psychodynamics of therapy and technical skills relevant to speech pathology. Methods of assessing and recording behavioral change. (2F) **Johnson**

365. (165) Clinical Processes and Behavior. A consideration of clinical management as an interactive process. Techniques of analyzing therapeutic interaction. Inter-personal processes as they relate to the clinical aspects of communicative disorders. Laboratory experience in observing and quantifying clinical processes. Relevant material from clinical psychology, counseling and psychiatry. (3W) **Johnson**

424. (124) Teaching Language to the Hearing Impaired. Language programs for intermediate, junior high school and high school hard-of-hearing children. A study of structured language procedures for children with a severe hearing loss. (3W) **Clark**

431. (131) Diagnostic Methods in Speech Pathology. Diagnosis and appraisal of speech disorders, including principles and techniques used in case study interview. (3F) **Jensen**

434. (134) Teaching Reading to the Hearing Impaired. The relationship of a hearing loss to reading. Reading development and problems of hearing-impaired children. Diagnosing reading problems. Reading programs for hearing-impaired children. (3Sp) **Clark**

451. (151) Disorders of Phonation. An introduction to the study of voice disorders and therapeutic methods for the correction of such problems. Basic information regarding theories of voice production will be discussed as well as anatomical and physiological correlates. Psycho-emotional, functional, and organic phonation disorders. Special attention given to the problem of alaryngeal speech. (2W) **Johnson**

454. (154) Speech Reading. Principles and methods pertaining to optimal use of visual perception by persons with impaired auditory acuity. (3W) **Berg**

471. (171) Stuttering. Theoretical, clinical and experimental approaches to stuttering and other disorders of speech rhythm. (3Sp) **Jensen**

500. (200) Institute in Communicative Disorders. Special colloquial offerings in Com-

municative Disorders. Time and credit arranged. **Staff**

527. (127) Psycho - acoustic Instrumentation. The first portion of the proposed course will be a consideration of basic fundamentals of electricity and electronics. Atomic structure, properties of electrons, properties of conductors and insulators, fundamentals of voltage, current and resistance, fundamentals of direct and alternating current, power, inductance, capacitance, transformer action and impedance will be considered. A second major division of the course will involve training in the use of instrumentation involved in psychoacoustic research and in the clinical programs of audiology and speech pathology. Some of the basic instrumentation which will be considered include voltmeters, ampmeters, ohmeters, tape recorders, signal generators, power level recorders, calibration equipment, microphones, sound spectrograph, filter networks, and amplifiers. Prerequisites: CD 115, 175. (3Sp) **Viehweg**

537. (137) Structure Function and Dysfunction of the Hearing Mechanism. Anatomy of the peripheral auditory system: external ear, conductive mechanism of the middle ear, cochlear system and vestibular system of the inner ear, and the anatomy of the VIII cranial nerve. Tissues, osseous structures, muscles, neuro and blood supply of each division of the peripheral auditory system. The central auditory nervous system involving various wave stations, the brain stem, mid-brain and cortex. Physiological function of the structures, identified in the anatomy portion of the course. Diseases and disorders of the ear that relate to defects in the function and structure of the hearing mechanism. Specific disease processes and disorders will be related to specific anatomical and physiological disorders. Prerequisite: CD 310. (3W) **Viehweg**

541. (141) Internship in Speech Pathology. Supervised diagnostic and remedial case-work with speech-handicapped individuals. May be taken more than one quarter. Time and credit arranged. **Staff**

544. (144) Internship in Educational Audiology. Supervised diagnostic and remedial casework in educational audiology, i.e., in the educational management of the hard-of-hearing individual. Time and credit arranged. **Berg, Clark, Staff**

547. (147) Internship in Audiology. Supervised diagnostic and remedial casework in audiology. May be taken more than one quarter. Time and credit arranged. **Taylor, Viehweg**

561. (161) Communicative Disorders of Cleft Palate. Nature, etiologies, and principles of treatment of speech disorders resulting from cleft palate. (3W) **Littledike**

564. (164) Auditory Training. Principles and methods pertaining to optimal use of residual hearing by persons with impaired auditory acuity. (3Sp) **Berg**

575. (175) Introduction to Research in Communicative Disorders. An orientation to research methods, experimental design and current research issues. Formation of original research in prospectus form leads to master's thesis by invitation. Application of parametric and non-parametric statistics to the literature in communicative disorders will be emphasized. (3Sp) **Johnson**

590. (190) Independent Study. Selected work, individually assigned, handled and directed. Problems of mutual interest to students and the instructor are investigated and reported on. (F, W, Sp, Su) **Staff**

Graduate

604. (204) The Young Hearing-Impaired Child. Problems of teaching hearing-impaired children of preschool age: observation and teaching in the preschool department of the Idaho State School for the Deaf. (3F) **Clark**

607. (207) Speech Intelligibilty. Factors pertaining to the appropriate reception of speech, including the patient's ability to utilize syntactic and semantic as well as acoustic cues, auditory perceptual synthesis, short- and long-term articulation index fundamentals. (3F) **Viehweg**

610. (210) Medical Background of Communicative Disorders. Speech and hearing specialists and medical specialists participate jointly in a series of lectures with communication disorders and the multidisciplinary approach to treatment as the common core of concern. (4Su) **Staff**

611. (211) Neuropathologies of Speech. A study of language and speech problems due to lesions of the nervous system, including cerebral palsy, aphasia and other dysarthias. Prerequisites: CD 170, 310 (5F) **Jensen**

614. (214) Dactyology. A study of manual communications as used by the hearing impaired (deaf) in America. Fingerspelling, manual signs, natural gestures, and combinations of manual communication with oral communication will be studied. Students will acquire a basic knowledge of the use of manual communications. (2W) **Clark**

617. (217) Hearing aids. Post-medical rehabilitative needs of the hearing impaired; criterion for establishing the need for and benefit of wearable electro-acoustic amplification; historical and contemporary evaluation philosophies; professional-commercial relationships, electroacuostic assessment of instrument fidelity. (3F) **Taylor**

627. (227) Pediatric Audiology. Special tests and procedures for examining hearing of infants and small children. (3Sp) **Taylor**

637. (237) Differential Diagnosis of Auditory Disorders. Advanced theory and practice of audiological evaluation. (3W) **Taylor**

641. (241) Public School Internship in Speech Pathology. Supervised diagnostic, remedial and educational internship appropriate to the area of specialization. (4F, W, Sp) **Staff**

644. (244) Public School Internship in Educational Audiology. Supervised off-campus internship in educational audiology, i.e., the educational management of hard-of-hearing children and youth. (4-8F, W, Sp) **Staff**

685. (new) Seminar in Communicative Disorders (Audiology). Research and analysis of selected topics. May be repeated. (2F, W, Sp) **Staff**

685. (new) Seminar in Communicative Disorders (Educational Audiology). Research and analysis of selected topics. May be repeated. (2F, W, Sp) **Staff**

697. (295) Thesis. Credit arranged. (F, W, Sp, Su) **Staff**

699. (400) Continuing Graduate Advisement. Credit arranged. (F, W, Sp, Su) **Staff**

**Department of*

Dairy Science

Head: Professor George E. Stoddard

Professor Vearl R. Smith

Associate Professors Melvin J. Anderson,[1] John J. Barnard, Dennis Funk, Robert C. Lamb[1]

Assistant Professors Clive W. Arave, Charles H. Mickelsen

Research Assistant H. Miles Geddes

Degrees: Bachelor of Science (BS), Master of Science (MS), Doctor of Philosophy (PhD) (in the Interdepartmental Nutrition Curriculum)

Major: Dairy Science with emphasis in Science, Business, or General Dairy Science

Undergraduate Study

Students in Dairy Science may select training in a general, science or business curriculum with optional course development in breeding and genetics, nutrition, management, pre-veterinary, economics or other specialties offered at the University. Practical dairy farm experience is considered essential for the general and business curricula and highly desirable for the science curriculum before being graduated with a Bachelor of Science degree.

In the science curriculum, specialized training is provided in nutrition and in breeding. Those completing a science training prepare themselves for such job opportunities as laboratory technicians, industry consultants and further training as graduate students.

*In College of Agriculture.
[1]ARS Collaborators.

The business curriculum provides training in business methods and economic principles in preparation for managing personally owned or commercial dairy farms and the many allied businesses, such as equipment and supply companies, feed mills and artificial insemination units.

A general curriculum provides training for those who plan to manage a dairy farm or work with those who manage a dairy farm. Fieldmen, Extension employees and artificial insemination specialists are typical positions for those trained within the general curriculum.

Additional information concerning required courses can be obtained from the department.

Suggested course of study for the first two years for Dairy Production curricula:

FRESHMAN YEAR

Courses	Credits
English 101, 102, 103	9
Ag Economics 201, 202, 220	9
Dairy Science 120	3
Math 101, 105, 106	8-13
MS, AS, or PE	3
Humanities or Social Sciences (group)	18
Electives	0-5
	50-55

SOPHOMORE YEAR

Biology 120, 121	10
Bacteriology 111, 112	5
Dairy Science 151	2
Veterinary Science 120	5
Food Science 160	5
Chemistry 121,[2] 122,[2] 123,[2] or 111, 112, 141	15
Humanities or Social Sciences (group)	4
Electives	3
	49

Suggested course of study for the Junior and Senior years in the science curriculum:

Dairy Cattle Nutrition Option:

Biology 512	5
Animal Science 440, 441	6
Dairy Science 310, 311, 352, 520, 530, 550, 515	27
Food Science 355	5
Bacteriology 515, 516	4
Chemistry 360, 331, 332, 370	17
Physics 110 or 111, 112, 113 or 121 122, 123	5-15
Veterinary Science 300	4
Electives	23-33
	96-116

Dairy Cattle Breeding Option:

Biology 512	5
Zoology 557	5
Animal Science 440, 441, 520	9
Dairy Science 310, 311, 352, 520, 530, 550, 515	24
Bacteriology 120, 121	4
Chemistry 331, 332	8
Math 220, 221, 223	15
Veterinary Science 300, 320	5
Electives	26
	101

Suggested course of study for the Junior and Senior years in the business curriculum:

Dairy Cattle Business Option:

Biology 512	5
Animal Science 440, 441	6
Dairy Science 310, 311, 352, 520, 530, 550, 515	24
Veterinary Science 300	4
Accounting 305, Business Administration (including 301, 435)	24
Economics 200	5
Ag Economics (including 560)	12
Electives	20
	100

Suggested course of study for the Junior and Senior years in the dairy production general curriculum:

Biology 512	5
Animal Science 440, 441, 520	9
Dairy Science 310, 311, 352, 520, 530, 550, 515	22
Veterinary Science 300, 320	5
Plant Science 432, 555	8
Soils 358	4
Entomology 539	5
[2]Directed Electives	25
Electives	17
	100

[2]These courses are required in the science curriculum. They are recommended but not required in other curricula.

Graduate Study

The Dairy Science Department offers a Master of Science degree in Dairy Production. The Master of Science degree is acceptable by other universities toward further study on a PhD degree. Students may work on a Master of Science or a PhD degree in the Nutrition and Biochemistry Interdepartmental Curriculum as outlined in this catalog under School of Graduate Studies.

Dairy Science Courses

Undergraduate

120. (20) Introductory Dairying. Genetics, nutrition, land, labor and capital are considered as resources available to management. Records, quality tests and merchandising programs are evaluated. (3F) **Stoddard**

151. (51) Dairy Cattle Judging and Evaluations. Types of various breeds of dairy cattle, judging individual animals, showing, type classification, type and production relations. Visits to dairy farms. (2Sp) **Arave**

310. (110) Dairy Production. The dairy herd enterprises with emphasis on managing for economical production through proper breeding and selection, feeding, rearing, housing, record keeping, milking, sanitation, and disease control. (3Sp) **Arave**

311. (111) Dairy Production Laboratory. Practical exercises in dairy management, including breeding, pedigree preparation and evaluation, feeding, santitation, housings, planning and projected employment plans of each student, organization, type evaluation and fitting and showing the dairy cattle. (2Sp) **Arave**

***352. (112) Feeding Dairy Cattle.** Characteristics of standards and feeding systems. Economy and comparative value of feeds on irrigated farms. Prerequisites: Animal Science 440, 441. (3W) **Stoddard**

Advanced Undergraduate

515. (215) Dairy Seminar. (1) **Staff**

***520. (120) Dairy Cattle Breeds and Breeding.** Inherited characteristics of dairy cattle to be considered in selecting breeding stock. Breeding programs and systems in use. Breeds of dairy cattle, breed organizations and their programs, testing plans, pedigree analysis, record keeping and study of breeding establishments. Prerequisite: Biology 512. (5W) **Arave**

****530. (121) Milk Secretion.** Anatomy and function of the mammary gland, theories of secretion, methods of milking, mastitis control, factors affecting composition, quality and quantity of milk. Prerequisite: Organic Chemistry. (3W) **Stoddard**

550. (122) Dairy Herd Management and Operation. Dairy herd management, land-livestock balance, operational efficiencies, herd improvements, new developments and trends, and critical analysis of dairy literature. Student discussions and reports. Open to Seniors in Dairy Production or by permission of instructor. (3Sp) **Stoddard**

590. (254) Special Problems in Dairy Science. Credit arranged. (F, W, Sp, Su) **Staff**

Graduate

697. (220) Research in Dairy Science. Credit arranged. (F, W, Sp, Su) **Staff**

699. (400) Continuing Advisement. Credit arranged. **Staff**

Nutrition and Biochemistry Seminar. See Animal Science 685.

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‡Directed electives to be selected in consultation with head of the department to meet

*Taught 1971-72.

**Taught 1972-73.

*Department of

Economics

Acting Head: Professor Reed R. Durtschi

Office in Business 611

Professors Roice H. Anderson, Leonard J. Arrington, Robert P. Collier, Lynn H. Davis, B. Delworth Gardner, Allen LeBaron, Leon C. Michaelsen, N. Keith Roberts, Morris H. Taylor, E. Boyd Wennergren

Professor Emeritus Evan B. Murray

Associate Professors Jay C. Andersen, Rondo A. Christensen, Lloyd A. Clement, Paul R. Grimshaw, Bartell C. Jensen, Glenn F. Marston, Darwin Nielsen

Assistant Professors O. William Asplund, Ray Finch, Herbert H. Fullerton, Gary B. Hansen, Kenneth S. Lyon, J'Wayne McArthur, James B. McDonald, Marcelo Peinado, Roger A. Sedjo, A. Clark Wiseman

Postdoctoral Fellows Morris Whitaker, Reed Willis

Research Assistant Stuart Richards

Collaborator Clyde E. Stewart

Degrees: Bachelor of Arts (BA), Bachelor of Science (BS), Master of Agricultural Industries (MAI), Master of Arts (MA), Master of Science (MS), Master of Social Science (MSS), Doctor of Philosophy (PhD)

Majors: Economics, Agricultural Economics

Economics

Undergraduate Major

The following are requirements for a major in Economics:

A) Earn a minimum of 30 credits in Economics courses numbered above 301.

B) Complete the following departmental core courses or equivalents: Economics 200, 201, 500, 501, 510.

C) Complete at least one course numbered above 500 from any four of the subject areas in Economics: Econometrics, Economic Development, Economic History, History of Economic Thought, International Economics, Labor and Manpower, Mathematical Economics and Programming, Methodology (Econ 605, 606 and 607), Money and Banking, Public Finance, and Resource Economics.

D) Complete the following non-Economics courses or equivalents: 1) Mathematics 105, 345, and 346, 2) Statistics—six credits in courses numbered 300 or above, 3) Accounting 305 or 201, 202, and 203.

Elective Courses. Economics majors are encouraged to tailor their programs to meet individual career objectives. This is possible for Economics majors because the minimal number of required courses permits selection of a

*In Colleges of Business and Agriculture.

large number of elective courses from Economics or from other departments.

Graduate Study

Candidates for the master's degree in Economics may select either a thesis or a non-thesis option. Areas of specialization include Economic Theory, Econometrics, Economic History, Labor Economics, Economic Education, Money and Banking, Economic Development, Public Finance and International Trade.

Graduate students interested in Economic Education should pursue the Master of Social Science degree. See the Graduate Catalog for additional information on the master's and doctor's programs in Economics.

Center for Economic Education

Located in the Department of Economics, this center has the responsibility of improving the effectiveness of economic education at the elementary, secondary, and college levels. Its activities include a program of research in economic education, retraining of practicing Economics teachers, assisting in the training of new teachers, and consultation. The center works closely with the College of Education, Extension Services, other centers throughout the country, and the national organization — the Joint Council on Economic Education.

Agricultural Economics

Undergraduate Major

Students who major in Agricultural Economics must complete the following departmental core courses or equivalents:

1) Agricultural Economics—18 credits in courses numbered 300 or above, 2) Economics 200, 3) Economics 201 or Agricultural Economics 200 and 201, 4) Economics 500, 5) Economics 501, 6) Economics 510, 7) One other Economics class numbered above 500, 8) Mathematics 105, 9) Mathematics 345, 10) Mathematics 346, 11) Statistics — six credits in courses numbered 300 or above, 12) Accounting 305 or 201, 202 and 203.

The student is encouraged to enroll in courses which fulfill University group requirements and provide principles and background for other courses early in the course of study. Three options are available within the Agricultural Economics major which allow some selection of courses depending on the student's interest. The requirements, by option, are listed below:

Area	Agri Bus	Gen Ag	Int Ag
Freshman English	9	9	9
MS or PE	3	3	3
Exact Sciences	23	23	23
Biol Sciences	10	15	10
Humanities	10	10	15
Soc and Behav Sciences	22	15	32
Economics	25	25	25
Bus Adm	20	10	10
Ag Prod	15	28	33
Ag Econ	18	18	18
Electives	31	30	15
Total Credits	186	186	196
Major[1]	43	43	43
Upper Division Credits	60	60	60

Graduate Study

The department offers the Master of Science degree with emphasis on any one of several areas in Agricultural Economics. This program is specifically designed to give the student a base in economic theory and depth in an area or areas where he has a specific interest. Specific areas of study are: Agricultural Business Management, Farm or Ranch Management, Resource Economics, En-

[1]Courses in Agricultural Economics and/or Economics.

vironmental Economics, Agricultural Finance, and Agricultural Marketing. Emphasis in this program will be on analytical rigor and theoretical competence.

For additional information on the Master of Science degree and for information on the Master of Agricultural Industries and PhD degrees, see the Graduate Catalog. These programs are open to students with or without a bachelor's degree in Agricultural Economics.

Economics Courses

Undergraduate

200. (51) General Economics. For any University student regardless of major. Principles and institutions underlying operations of the economic system. (5F, W, Sp, Su) **Staff**

[1]**201. (52) Economic Problems.** Continuation of Econ 200. Economics of a competitive market; commodity markets and factor markets. (5F, W, Sp, Su) **Staff**

[1]**300. (101) Macro Economics.** Emphasis on general area of national income economics with an integration of financial institutions. Offered to students prepared to use the shortcuts offered by a mathematical approach to economics analysis. (3) **Staff**

[1]**301. (100) Micro Economics.** Economics of supply, demand and pricing. Offered to students who are prepared to use the shortcuts offered by a mathematical approach to economics analysis. (3) **Staff**

302. (185) Economics for Teachers. A combination principles and methods course for secondary and lower division college teachers and prospective teachers of economic subjects. Econ 200 and 201 are recommended prerequisites. **Marston**

500. (108) Income Theory. Analysis of the underlying causes of unemployment, economic instability, inflation and economic growth. (4F, W, Sp) **Staff**

501. (107) Price Theory. Theory analyzing the economic behavior of households and business firms within the framework of private capitalism. (4F, W, Sp) **Staff**

510. (106) History of Economic Thought. Origin and development of economic theories of leading thinkers in western civilization from 1750. (3) **Arrington, Asplund**

511. (170) Economic History of the United States. Development of agriculture, industry, labor, transportation and finance from colonial times. (5) **Arrington.**

512. (175) Economic History of Far West. Development of agriculture, industry, transportation, and finance of the Far West with special attention to the economic development of Utah. (3) **Arrington**

515. (150) Comparative Economic Systems. History, economic theories, and comparative policies of communist, socialist, and capitalistic economies. (3Sp) **Collier**

520. (123) Introduction to Labor. A comprehensive review of the development of the labor-management relationship and the growth of trade unionism in the United States; the study of the formal and informal structure, government, operations, and administrative problems of American labor unions. (3F) **Hansen, Murray**

521. (125) Collective Bargaining. Describes and analyzes the formulation and administering of collective agreements between labor and management. (3F, W) **Hansen, Marston**

522. (128) Labor Force Analysis and Manpower Economics. Includes composition of the labor force, programs to combat joblessness and poverty, job-seeking and employment practices, and the economic effects of unions. (3W) **Hansen**

523. (126) Trade Unionism and the Law. The legal framework of trade union activity; restrictive, permissive, and promotional legislation; the judiciary and labor. (3Sp) **Murray**

530. (174) Business and Government. The role of the giant corporation in modern economic life, public regulations of monopoly and competitive practices; international and domestic cartels; alternative policy toward business. (3Sp) **Staff**

532. (171) Business and Economics Forecasting. (5) **Staff**

533. (135) Transportation Economics. Economic principles that underlie rate structures and work of regulatory agencies. (3) **Staff**

534. (147) Public Utilities. Characteristics of public utilities, regulatory commissions, rate structures, rate discrimination, finance, and rates of returns. (3) **Staff**

540. (140) International Economics. Basic economic relationship between industrial nations, trade restrictions, international debt and finance, and means of promoting progress based on sound economics. (5W) **Sedjo**

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[1]Econ 200 and 201 or 300 and 301 are prerequisites for all upper division classes except 511, 512, 520, 530, 552.

550. (155) Public Finance and Fiscal Policy. How governments attempt to carry out policy objectives. Four broad objectives: allocation of resources, distribution of income, stabilization of income, prices and employment, and economic growth. (3F) **Asplund**

551. (156) State and Local Finance. A federal versus a unitary state, cost-benefit analysis, urban and regional problems, education and economic growth, and the growth of welfare payments are among the possible topics for discussion in a course designed to meet the particular interests of the class. (2) **Asplund**

552. (127) Social Security and Income Maintenance. Survey of the main division of social security legislation: workmen's compensation, legal minimum wage, regulation of hours, unemployment compensation, old-age insurance, family-wage systems and health insurance. (3Sp) **Murray**

560. (165) Money and Banking. Development of our present monetary and banking system: a critical analysis of central banking. (5F, W, Sp) **Lyon, Wiseman**

570. (190) Quantitative Economics I. A study of the principal mathematical formulations used in economic analysis. Designed to acquaint the student with those aspects of economic theory typically formulated in mathematical terms. Prerequisites: Math 105, Econ 501. (3F) **Jensen, McDonald**

571. (191) Quantitative Economics II. Continuation of Econ 570. Prerequisite: Econ 570. (3W) **Jensen, McDonald**

572. (192) Quantitative Economics III. Continuation of Econ 571. Prerequisite: Econ 571. (3Sp) **Jensen, McDonald**

580. (180) Economic Development. Theories and principles of economic development, characteristics and problems of underdeveloped and developing countries, alternative techniques and policies for the promotion of growth and development. (3F) **Asplund**

Graduate

600. (208) Income Theory. Prerequisite: Econ 500. (3F, Sp) **Durtschi, Wiseman**

601. (207) Price Theory. Prerequisite: Econ 501. (3F, W) **Gardner, Lyon**

605. (203) Economic Research. (3W) **Arrington, Jensen**

610. (206) History of Economic Thought. Prerequisite: Econ 510. (3F) **Staff**

611. (270) Economic History. (3F) **Arrington**

612. (215) Readings in Economic History. Credit arranged. (F, W, Sp, Su) **Arrington**

614. (211) Literature of Economics. Permission of instructor required. (2W) **Staff**

620. (225) Labor Economics. Applications of principles and practices of American trade-unionism brought to light through individual and group research projects; analysis and evaluation of current issues in labor activities. Prerequisite: Econ 520 or 521. (3W) **Hansen**

624. (227) Collective Bargaining in Public Employment. Major attention will be directed at existing and proposed statutes covering the employment arrangement for public employees, the subject matter and administration of collective agreements, the resolution of negotiating impasses, and the strike against government. **Hansen**

640. (240) International Economics. Prerequisite: Econ 540. (3Sp) **Sedjo**

650. (255) Public Finance. Prerequisite: Econ 550. (3Sp) **Asplund**

660. (265) Money and Banking. Prerequisites: Econ 501, 560. (3W) **Lyon**

670. (290) Introduction to Econometrics. Introduction to the problems of construction and estimation of single equation models. Emphasis is placed on economic interpretation as well as methodology. A knowledge of calculus and statistics is required. (3F) **Jensen**

671. (291) Theory of Econometrics I. An investigation into errors in variables, autocorrelation, multicollinearity, heteroscedasicity, lagged variables, dummy variables, as encountered in single equation models. (3W) **Jensen**

672. (292) Theory of Econometrics II. Simultaneous equation estimation including identification and the following estimation procedures: indirect least squares, multiple-stage least squares, full information maximum likelihood, and k-class estimators. (3Sp) **Jensen**

673. (293) Dynamic Model Building. A detailed investigation of the formulation of structural representations of economic hypotheses, tests of these hypotheses, and properties of alternative estimators of parameters associated with the structural representation.

680. (280) Economic Development. (3F) **McDonald, Wennergren**

690. (201) Readings and Conferences. Credit arranged. (F, W, Sp) **Staff**

691. (202) Independent Research. Credit arranged. (F, W, Sp) **Staff**

697. (200) Thesis. Investigations by graduate students. Credit granted according to work done. (F, W, Sp) **Staff**

699. (400) Continuing Graduate Advisement. **Staff**

700. (308) Income Theory. Advanced income, monetary and fiscal analysis. Prerequisite: Econ 600. (3Sp) **Lyon**

701. (307) Price Theory. Allocation and distribution theory. Prerequisite: Econ 601. (3Sp) **Gardner**

Agricultural Economics Courses

Undergraduate

200, 201. (71, 72) Agricultural Economic Principles. (3F, 3W) **Staff**

220. (73) Agricultural Industry Analysis. The role of agriculture in the American economy. Analyzes the efficiency and effectiveness of American agriculture and deals with the problem of sustaining the incomes of families engaged in agricultural pursuits.

230. (45) Introduction to Agribusiness. An introduction to the nature, scope, importance, and relationships to the general economy and occupational opportunities in agriculturally related businesses. (2F) **Christensen**

231. Agricultural Business Record. Methods of keeping and analyzing physical input-output and financial records for agricultural business firms. (3F) **Christensen**

390. (150) Special Readings. Credit arranged. (F, W, Sp, Su) **Staff**

510. (102) Farm and Ranch Management. Principles and practices associated with the successful operation of farms. (3F) **Davis**

515. (172) Farm and Ranch Management Analysis. Problem solution and practices associated with the successful organization and operation of farms utilizing economic and farm management principles through projecting linear programming and other methods of analysis. Prerequisite: Ag Econ 510. (3W) **Davis**

517. (116) Livestock Economics. Application of farm management and agricultural marketing principles to the economic production of livestock and livestock products. (3Sp) **Nielsen**

520. (180) Public Policy for Agriculture. A study of government in relation to selected economic problems, past and present, in agriculture. Emphasis is on the problems, the objectives of government action, the alternative proposals for action, action taken, and the results, so far as they can be interpreted. (3Sp) **Fullerton**

525. (155) Law on the Farm. A non technical consideration of some legal rights, responsibilities, and liabilities associated with the operation of a farming business. (3W) **Staff**

532. (130) Agricultural Credit. Principles of credit applied to financing agriculture and analyzing of credit institutions and agencies financing agriculture. (3W) **Staff**

533. (131) Agricultural Credit Procedures. Emphasis will be given to procedures in accepting and analyzing credit applications, writing credit instruments, and supplemental papers, and servicing loan arrangements and security. Consideration will be given to production, intermediate and farm mortgage financing. Prerequisite: Ag Econ 532. (3Sp) **Staff**

534. (170) Farm and Ranch Appraisal. An integrated presentation of the factors, principles, and techniques used in determining the money value of farm and ranch properties. Two lectures, one laboratory each week. (3Sp) **Davis**

535. (145) Agricultural Business. Application of economic and management principles to farm related firms that market and process farm products and provide farms with supplies and services. (4F) **Staff**

550. (106) Land Economics. Economic principles underlying utilization, valuation and tenure of land and water. Attention given prevailing policies, methods, and techniques involved in dealing with economic problems of land and water use. (3F) **Wennergren**

555. (186) Land and Water Economic Problems. Application of economic principles and techniques to the development, use and conservation of land and water resources. (3W) **Wennergren**

560. (163) Agricultural Marketing. Principles and functions of marketing as applied to agriculture. (3W) **Anderson**

565. (164) Commodity Marketing Analysis. Measurement of demand for the product, appraising the accuracy of the pricing system which reflects this demand to producers, and possibilities of reducing marketing costs. (4Sp) **Anderson**

575. (121) Statistics and Research Techniques. Emphasis on basic techniques used in collecting, analyzing, and presenting research data. (4W, 4Sp) **Davis**

580. (190) International Argicultural Development. A study of the agricultural sector in developing countries, and the part it plays in economic development. (3F) **Wennergren**

605. (265) Agricultural Price Analysis. Application of statistical techniques to derivation

of agricultural supply and demand functions. Time series and cross sectional analysis, single and simultaneous equation estimation. (3W) **Staff**

606. (240) Research Methodology. Philosophy of research and importance of application of scientific method to solution of research problems. (2F) **LeBaron**

607. (241) Research Methodology. Introduction to the similarities between statistical methods and the systems by which scientists establish hypothesis and test hypothesis by means of experimental data. The relation of statistical theory to the design of experiments will be emphasized. Prerequisites: Applied Statistics 576, 577, 578. (2Sp) **Nielsen**

610. (200) Agricultural Production Economics. (3W) **Davis**

611. (220) Agricultural Production Decision Theory. Static and stochastic models. Effects of different decision criteria on optimization procedures. (3Sp) **Nielsen**

620. (280) Agricultural Policies. Application of economic principles and methods of analysis to the formulation and appraisal of agricultural policies and programs. (3Sp) **Fullerton**

650. (257) Resource Economics. Application of welfare and allocation theory to resource development. Evaluation of public investment decisions. Economic and philosophical implications implicit in the development of federal and state resource policy. (3Sp) **Staff**

651. (256) Water Resource Economics. The productivity of capital, intertemporal resource allocation and investment criteria in water resource use. **Wennergren**

660. (263) Agricultural Marketing. (3F) **Anderson**

690. (250) Special Problems. Credit arranged. (F, W, Sp, Su) **Staff**

691, 692, 693. (235, 236, 237) Seminar. Required of all Senior and graduate majors. (1F, W, Sp) **Staff**

697. (214) Thesis. Credit arranged. (F, W, Sp, Su) **Staff**

699. (400) Continuing Graduate Advisement. **Staff**

**Department of*

Educational Administration

Head: Professor Charles O. Ryan

Office in Education 310

Professors Oral L. Ballam, Lloyd A. Drury, Basil Hansen, Terrance E. Hatch, Ellvert H. Himes

Professor Emeritus John C. Carlisle

Assistant Professors James A. Jacobsen, Rolfe Kerr, Carolyn F. Steel, Robert A. Wininger

Degrees: Specialist in Educational Administration (Spec. Ed. Admin.), Doctor of Education (EdD)

Major: Educational Administration

The Specialist in Educational Administration is offered for those who wish to qualify as superintendents, staff administrative personnel, or elementary and secondary school principals. In addition, the doctoral degree is intended to train people for top administrative positions or higher level teaching positions.

All programs through the doctor's degree are fully approved by the Northwest Association of

*In College of Education.

Secondary and Higher Schools and by the National Council for Accreditation of Teacher Education, which in turn means approval by the American Association of School Administrators.

Programs offered by the department will satisfy the certification requirements outlined by the Utah State Board of Education. Candidates may seek either a basic professional or a professional certificate for positions as elementary principals, secondary principals and superintendents. To receive a basic professional endorsement requires credits in an approved program in school administration. The professional endorsement requires a planned two-year graduate program in Educational Administration (specialist degree). Other specific requirements are outlined in the regulations of the State Board of Education. Details of these programs are available from the Department of Educational Administration. For additional information and more specific details, see the Graduate Catalog.

Educational Administration Courses

624. (227) Collective Bargaining in Public Employment. See Economics 624. (3F, Su) **Hatch**

656. (207) Elementary School Administration. (3W, Su) **Ryan, Wininger**

657. (236) Secondary School Administration. Topics in secondary school administration, including problems of teacher-pupil personnel, the principal as supervisor, and managing the activity program. Designed for experienced school principals, and those preparing for the administrator's certificate in secondary education. (3W, Su) **Hatch**

654. (254) Organization and Administration of Education. The work of the school administrator and the principles upon which the profession of school administration is practiced. Federal, state, and local relations to education. (3F, Sp, Su) **Hansen, Hatch, Ryan, Wininger**

660. (260) Historical and Philosophical Foundations of Education. Deals with major philosophies of education in their historical setting and their effect upon subsequent development of the American school system. (3F, W, Sp, Su) **Hansen**

661. (261) Organization and Administration of Special Education. Designed to provide public school administrators with background and training for the administration of special education. Deals with the background and purposes of special education, the systems and organization for programs and financing, and the legal implications related to programs. Identification procedures and community, school, and parent relationships. Involvement will be provided in current issues and trends in special education. (3F, Su) **Wininger**

665. (265) Systems Analysis and Application to Education. Systems theory as applied to education and systems analysis procedures appropriate to planning and problem solving in education. (3W, Sp, Su) **Jacobson**

666. (266) Introduction to Research in Education. Provides teachers and school administrators with research tools that they may apply directly to their practical problems. The specific objectives of the course are: 1) to give students an appreciation of scientific methods of problems solution, 2) to acquaint students with a research literature in Education and teach them how to use it, 3) to provide training and experience in action research. Prerequisite: Secondary Education 164 (or taken concurrently). (3F, W, Sp, Su) **Steel, Wininger**

667. (267) Research in Psychology and Education. Deals with identifying a problem for the thesis, reviewing and evaluating research and literature, and designing and carrying out the research project. An area of research interest should be identified before enrolling in the course. Prerequisite: Psychology 112. (3F, Sp, Su) **Shaver**

669. (269) Comparative Education. The school system and educational problems of Europe, Latin America, the Middle East, Far East, and Russia. Students from foreign lands and resident faculty members personally acquainted with various education programs are utilized as resource persons. (3F, Su) **Hansen**

670. (270) Public Relations in Education. Objectives, guiding principles, techniques and media for an improved school public relations program. (3W, Su) **Hansen**

674. (274) Legal Aspects of School Administration. Emphasizes responsibilities and functions of local and district school administrators. Interpretation of legal status, form and procedure as established by statutes, legal opinions, and court decisions. (3F, Su) **Hatch**

676. (276) Field Experience in School Administration. Provides introductory experiences in school administration. Students work a minimum of five hours weekly under the direction of an administrator in the public schools, either elementary or secondary. The University supervisor will direct programs and meet in seminars periodically. Credit arranged. (F, W, Sp) **Hatch, Ryan**

697. (285) Research and Thesis Writing. Credit arranged. (F, W, Sp, Su) **Staff**

745. (355) School Plant Planning. School housing surveys, location and capacity of schools, instructional needs as a basis for planning, standards for equipment, checking plans and specifications, business and legal provisions governing financing and construction of new buildings, bids and contracts. (3F, Su) **Jacobson, Ryan**

748. (368) Higher Education. A study of the development and current status of education beyond the high school in America. (3W) **Himes, Kerr**

749. (369) The Junior College. The community junior college, its philosophical and historical backgrounds, organization and administration, growth, and roles in today's higher education. (3Sp, Su) **Himes, Kerr**

750. (381) School Finance. Historical background of school finance; principles and practices involved in collecting and distributing school revenues, with special reference to conditions in Utah. (3F, Su) **Wininger**

761. (361) Readings in Foundations of Education. Considers problems of education in terms of their sociological, historical, and philosophical foundations. (3W, Su) **Hansen**

760. (360) Philosophy of Education, Advanced. (3Sp, Su) **Hansen**

774. (374) Practicum in Public School Surveys. Field study or survey of a school district. Classroom discussions will be concerned with practical problems of the particular district. Education literature dealing with the area of school surveys will also be extensively considered. Open only to advanced students in School Administration with the specific approval of the instructor. Time and credit arranged. (F, W, Sp) **Jacobson, Ryan**

778. (362) Group Processes in Educational Leadership. Involves active participation of the students for the purpose of gaining a more accurate perception of themselves and others. Analyzes the involvement of group members for the purpose of improving communications. Research from studies in group dynamics will be drawn upon. (3F, W, Su) **Ryan**

775. (375) Advanced Seminar in School Law. Designed to allow each participant to pursue in depth those topics in educational law which are of interest to him and to keep abreast of developments resulting from changes in society, new legislation, court decisions, and administrative prerogatives. (3Sp) **Hatch**

780. (350) Seminar. Educational Administration and Personnel. Current theories about administration and the contribution of behavioral science research to the problems of organization and administrative behavior. Doctoral students only. (3F) **Ryan, Staff**

780. (351) Seminar. Educational Communication theory. Internal communication of the organization as related to the administrator's effectiveness. The problem of communications between the organization and its supporting public. Doctoral students only. (3W) **Jacobson, Steel**

780. (352) Seminar. Educational Administration Simulated Problems. Relationship in the administration process. Issues in international relations, cultural anthropology, comparative education and economies. Doctoral students only. (3Sp) **Staff**

784. (384) Internship in School Administration. Provides extensive experience for the advanced student working on the Doctor of Education degree in School Administration. Class members work a minimum of one quarter full time under the direction of an administrator in the public schools. Credit arranged. (F, W, Sp) **Hatch, Staff**

793. (283) Readings and Conferences. Provides for individually directed study in subjects of special interest and preparation. Credit arranged. (F, W, Sp, Su). **Staff**

797. (385) Field Studies and Thesis. Formerly 375. Individual work on research problems in the EdD program. Credit arranged. (F, W, Sp, Su) **Staff**

*Department of

Electrical Engineering

Head: Professor Bruce O. Watkins

Office in Engineering L-148

Professors Doran J. Baker, Kay D. Baker, Clayton Clark, Larry S. Cole, Bertis L. Embry, William L. Jones, Lawrence R. Megill

Associate Professors Duane G. Chadwick, Alvin M. Despain, Ronney D. Harris

Assistant Professors William I. Fletcher, Randall W. Jensen, Alan W. Shaw, Glen H. Smerage, Ronald L. Thurgood, Clair L. Wyatt

Research Engineers David A. Burt, L. Carl Howlett, Earl F. Pound

Degrees: Bachelor of Science (BS), Master of Science (MS), and Doctor of Philosophy (PhD)

Major: Electrical Engineering

The curriculum is accredited by the Engineers' Council for Professional Development.

The four-year program listed here leads to the Bachelor of Science degree in Electrical Engineering. A five-year program is also available for students planning to participate in the advanced military program, in athletics, or in part-time employment.

The curriculum provides a balanced program in the fundamental sciences and mathematics, engineering sciences, engineering design, humanities and communication skills. Laboratory work in small groups is an integral part of most courses to provide physical confirmation of basic principles and experience with instruments, components and engineering techniques.

Satisfactory completion of the BS program qualifies the student for entrance into the Electrical Engineering field with professional status.

*In College of Engineering.

Undergraduate Study

Lower Division. The Freshman and Sophomore common Engineering curriculum is listed in the College of Engineering introduction.

Upper Division

JUNIOR YEAR

Courses	Credits F	W	Sp
Elec Engrg 311, 312, 313	3	3	3
Elec Engrg 314, 315, 316	3	3	3
Elec Engrg 405, 346, 347	3	3	3
Elec Engrg 317, 318, 319	2	2	2
[1]Elec Engrg 507		4[1]	
[2]Humanities or Tech Elec	3		3
Mech Engrg 330	3		
English 305			3
	17	15	17

[1]Elec Engrg 507 may be taken either in the junior or senior year.

[2]Approved technical electives include courses shown in parentheses but not part of the selected sequence of footnote 3, and the following: Elec Engrg 493, 497, 529, 531, 565, and graduate courses, [3]Math 341, 342, 343, 441, 442, 443, 421, 422, 423, Physics 471, 472, 473, 341, 342, 343. Other courses may be selected with approval of adviser.

SENIOR YEAR[3] [4]

	F	W	Sp
Elec Engrg 580, (581, 582)	4	(4)	(4)
[1]Elec Engrg 507, (508, 509)		(3)	(3)
Elec Engrg 552, (553, 554)	4	(4)	(4)
Elec Engrg 540, (541, 542)	4	(4)	(4)
Elec Engrg 487, 448, 489	1	1	1
[5]Elec Engrg 491		2	
[2]Humanities or Tech Elec	3	5	5
	16	16	14

Graduate Study

The basic graduate program in Electrical Engineering includes circuits, waves, and fields, with supporting mathematics and physics. Specialization is available in the fields of antennas and propagation, control systems, microwave measurements, transistor circuitry and semiconductor physics, communication theory and radiometry.

To be admitted into the Electrical Engineering graduate program, the student should take the Graduate Record Examination (GRE), and the examination scores are to be presented with the entrance application. The advanced GRE test in either Mathematics, Engineering, or Physics should be taken, as well as the general aptitude test. A student may be admitted on probation without the advanced GRE test, and this test must then be taken during the first quarter of residence.

[3]Boldfaced senior courses are required. Each student shall select and complete at least one of the four sequences starting with Elec Engrg 507, 540, 552 or 580. In addition, at least four technical elective courses are required, of which three must be Electrical Engineering courses.

[4]Students planning to continue on to an MS or PhD degree should note that Math 441, 442, 443, or Math 421, 422, 423 are prerequisite to most graduate courses in Electrical Enginering. A Senior with a g.p.a. of 3.0 or over and an adviser's approval may elect to take one of the Math series in lieu of a required course and two electives as specified under footnote 3.

[5]Elec Engrg 491 may be taken either Winter or Spring of the Senior year.

The Master of Science degree may be obtained in four quarters, providing the graduate student has had training equivalent to that required for the BS Electrical Engineering degree at USU. If his training is inadequate, additional undergraduate course work, not credited toward the MS, may be necessary. Either a thesis (nine credits) or a Plan B design or research paper (three credits) is necessary for the MS degree. The Graduate Electrical Engineering Seminar is required for three quarters, but these credits (three) will not apply to the total credits (45) specified by the Graduate School. A graduate committee will be appointed for each candidate to plan a specific course of study to meet both degree requirements and interests of the student.

Extended programs of study, in cooperation with the Departments of Physics, Mathematics, and Mechanical Engineering, may lead to the Doctor of Philosophy degree in Electrical Engineering. For further details on graduate study, refer to the Graduate Catalog.

Electrical Engineering Courses

Undergraduate

271. (71) Electric Circuits. Electrical circuits, quantities, laws, and functions. Exponential, DC, and sinusoidal steady state behavior. Pole-zero diagrams, time and frequency domain analysis. Power in AC circuits. Prerequisites: Physics 222 or equivalent, Math 222. Recommended: Concurrent registration in Math 223. Four lectures, one lab. (5F, W, Sp, Su) **Staff**

311, 312, 313. (111, 112, 113) Network and System Theory. Analysis of linear passive/active networks and systems; loop, node, state space and flow graph techniques, matrix formulation and computer applications. Laplace transforms, feedback. Prerequisites: Elec Engrg 271, Gen Engrg 103, Math 324. Three lectures. (3F, 3W, 3Sp) **Jensen**

314, 315, 316. (114, 115, 116) Electromagnetics and Energy Conversion. Static electric and magnetic fields; Maxwell's equations; dynamic fields; plane waves; radiation; photo, thermo, chemical, mechanical and electrical energy conversion principles and apparatus. Prerequisites: Elec Engrg 271 and Math 324 (or take concurrently). Three lectures. (3F, 3W, 3Sp) **Baker**

317, 318, 319. (117, 118, 119) Electrical Engineering Laboratory. Exercises in measurements, data and recording and analysis, instruments, machines, electrical circuits, and devices. Prerequisites: Elec Engrg 271, Mech Engrg 120, and Gen Engrg 103 or equivalent; concurrent registration in Elec Engrg 405, 311. (Six credits per week.) (2F, 2W, 2Sp) **Staff**

345. (145) Materials and Electronics. Electronic materials; construction and characteristics of electronic devices; circuit models. DC and AC operating conditions; small and large signal analysis; feedback circuit applications. Prerequisite: Elec Engrg 271. Three lectures. (3F, Sp) **Staff**

346, 347. (146, 147) Linear Electronics Analysis and Design. Introduction to semi-conductor physics; diodes, transistors, analysis; noise, linear and operational amplifiers; feedback, oscillators; large signal analysis. Prerquisite: Elec Engrg 311. Three lectures. (3W, 3Sp) **Fletcher, Jones**

405. (105) Circuits and Machines. Single and 3-phase power circuits. Magnetic circuits, transformers and protective equipment. Introduction to DC and AC machines. Prerequisite: Elec Engrg 271 or equivalent. Three lectures. (3F, Sp) **Embry**

487, 488, 489. (175, 176, 177) Electrical Engineering Seminar. A weekly meeting of staff and Senior Electrical Engineering majors. Reports and discussions on developments in electronics and communications. Each student prepares and presents technical papers on suitable topics. (1F, 1W, 1Sp) **Staff**

491. (151) Design. Individual engineering assignments involving design, development, construction and testing of various types and units of electronic and communications equipment. A formal engineering report is required of each project. Seniors only. Two labs. (2F, W, Sp, Su) **Cole**

493.(new) Special Problems in Electrical Engineering, BS. Independent or group study of engineering problems not covered in regular course offerings. Time and credit arranged. (F, W, Sp, Su) **Staff**

497. (197) Honors Studies. Advanced work for qualified students, initiated by a student and may consist of a special individual project under the direction of a faculty member, or of advanced study in connection with an established departmental course. Prerequisite: A satisfactory grade point average, recommendation of the instructor and approval of the College of Engineering Honors Committee. This course may be repeated. (1-3, arranged) (F, W, Sp, Su) **Staff**

500. Introduction to Aeronomy. A survey of the properties and processes in the upper atmosphere. Topics included are atmospheric structure, magnetospheric phenomena, the ionosphere, solar terrestrial relationships, aurora and airglow, and atmospheric reactions. (3Sp) **Baker**

507. (107) An Introduction to Methods of Electrical Energy Conversion. Static and dynamic electro-magnetic devices to produce, control, and use electrical energy. Prerequisite: Senior standing in Engineering. Three lectures, one lab. (4W) **Embry**

508. (208) Advanced Energy Conversion. Direct energy conversion methods. Thermionic, thermoelectric, photoelectric, piezoelectric, magneto-hydro-dynamic, chemical cells, and other related topics. Prerequisite: Senior or graduate standing in Engineering. Three lectures. (3Sp) **Embry**

509. (209) Power Systems. Generation, transmission and distribution of electric power. Symmetrical components, computer solutions, system analysis. (3Sp) **Embry**

529. (129) Electroacoustics. Fundamentals of architectural acoustics: theory and principles of electro-mechanical transducers, including loud speakers, microphones and vibration pickups; recording methods and equipment; measurement techniques in acoustic and electromechanical systems. Prerequisites: Elec Engrg 312, 347. Three lectures, one lab. (4W) **Cole**

530. (130) Electronics for Scientists. Electrical measurements, power supplies, amplifiers, oscillators, servo systems, switching, timing, digital counting. Laboratory use of instruments. Prerequisites: Instructor's consent. Not for Electrical Engineering majors. Two lectures, one lab. (3W, Sp) **Smerage**

531. (131) Theory of Semiconductor Materials. Quantum mechanics background, band theory, conduction theory. Prerequisites: Elec Engrg 271. Three lectures. (3W) **Shaw**

540, 541, 542. (110, 141, 120) Distributed Circuits and Radiation. Transmission line theory, circuit parameters for distributed circuits, active and passive microwave devices, antennas. Prerequisites: Elec Engrg 540, 542: Elec Engrg 313, 316; Elec Engrg 541: Elec Engrg 540. Three lectures, one lab. (4F, 4W, 4Sp) **Clark, Harris, Shaw**

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*Taught 1971-72
**Taught 1972-73

552, 553, 554. (152, 153, 154) Systems Engineering. Analysis and design of signals and linear systems, discrete and continuous, deterministic and random. Time and frequency domains. Impulses and convolution; state space, stability, controllability. Electro-mechanical control systems, performance and compensation, modulation and coding. Prerequisites: Elec Egrg 552, 554; Elec Engrg 313, Math 324; Elec Engrg 553; Elec Engrg 552. Three lectures, one lab. (4F, 4W, 4Sp) **Smerage, Watkins**

565. (165) Analog Computers. Application of analog methods to the solution of engineering problems; principles of integrators, multipliers, function generators; time and amplitude scale factors. Prerequisite: Math 324. Two lectures, one lab. (3W, Sp, Su) **Staff**

580, 581, 582. (190, 191, 192) Digital Logic, Electronic Systems. 580 — Digital logic, Boolean algebra, logic design. 581, 582 — Active and passive wave shaping, comparators, integrated circuits, analog/digital techniques and computer design. Prerequisites: Elec Engrg 380; Upper division standing (and discipline); Elec Engrg 581; Elec Engrg 580; Elec Engrg 582; Elec Engrg 581. Three lectures, one lab. (4F, 4W, 4Sp) **Fletcher, Jensen**

585. (185) Introduction to Semiconductor Device Theory. Semiconducting materials; p-n junction theory, survey of new devices. Prerequisite: Senior standing or instructor's consent. (4F) **Jones**

Graduate

****602, 603. (202, 203) Advanced Semiconductor Theory.** Wave mechanics of electrons in metals and semiconductors. Band theory of solids. Theory of electrical conductivity. Prerequisite: Physics 570 or 673. (3W, 3Sp) **Shaw**

***604, 605. (204, 205) Magnetic Materials and Quantum Electronics.** Dia-, para- and ferromagnetic materials, paramagnetic masers and lasers. Prerequisite: Physics 570 or 673. (3W, 3Sp) **Shaw**

610, 611. (210, 211) Amplifier Circuit Theory. Gain and stability analysis of multistage transistor amplifiers; design of filter amplifiers using feedback techniques with discrete and integrated circuits; transient response of linear circuits; design of low noise amplifiers. Prerequisite: Elec Engrg 346 or 585. (4W, 4Sp) **Fletcher, Jones**

612. (212) High-Speed Switching Devices and Circuits. Semiconductor device transient analysis, the relationship of circuit switching properties to device physics. Prerequisite: Elec Engrg 585 or equivalent. (4Su) **Jones**

615, 616, 617. (215, 216, 217) Theory of Linear Systems. Fourier, Laplace, and Z transforms. Convolution and correlation. Delta functions and distributions. Vector and function spaces. State space, state equations. Time-invariant and time-varying linear systems. Stability, sensitivity, controllability, observability. Signal flowgraphs. Optimization techniques. Prerequisites: Math 441, 442, 443; Math 342 or concurrent registration. (3F, 3W, 3Sp) **Thurgood**

622, 623, 624. (222, 223, 224) Network Analysis and Synthesis. Mathematical analysis and design methods for two and four terminal passive networks having physically realizable driving point and transfer immittances. Analysis and design of networks with active elements. Multiport networks; analysis and synthesis using linear vector methods. Prerequisites: Elec Engrg 312, 615; Math 342, Gen Engrg 103 or take concurrently. Three lectures. (3W, 3Sp, 3Su) **Jones**

631, 632, 633. (261) Space Science and Engineering. First-year graduate level study of the engineering aspects of space exploration. Study topics include a survey of the cosmos and the solar system, the nature of the space environment and upper atmosphere, physical measurement techniuqes and instruments, space vehicles, celestial mechanics, spacecraft mechanics, spacecraft guidance, navigation, attitude sensing and control, space communication, telemetry systems, areospace equipment design, cryogenics, and aerospace electronics. (3F, 3W, 3Sp) **Wyatt**

****635, 636, 637. (235, 236, 237) Radio Wave Propagation.** Propagation in ionized mediums. Magnetoionic theory. Effects of collisional damping, anisotropy and reflection. Ray theory of wave packets, full wave and W.K.B. solutions to wave equation. Scattering of radio waves by rough surfaces, tropospheric sheets and turbulent fluctuations. Practical problems encountered in radio propagation in the earth's ionosphere and long distance communication. Prerequisite: Elec Engrg 316 or equivalent. (3F, 3W, 3Sp) **Clark, Harris**

638. (238) Selected Reading in Radio Science. Lecture arranged. (2F, W, Sp) **Clark**

640. (240) Microwave Measurements. Theory and practice in measurement of impedance, power, frequency and wave length at frequencies about 500 mc. Oscillators and detectors will be studied along with the characteristics of certain types of transmission line and associated equipment in the microwave region. Prerequisites: Elec Engrg 316, 541, or equivalent. (3Sp) **Harris**

***642, 643, 644. (242, 243, 244) Applied Plasmadynamics.** Characteristics of the plasma-state and plasma generation; velocity distri-

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*Taught 1971-72
**Taught 1972-73

bution functions, collisions and Boltzman equation: orbit theory oscillations and wave modes in a plasma; transport theory; propagation of electromagnetic waves in plasma; plasma devices. Prerequisites: Elec Engrg 316 or equivalent. (3F, 3W, 3Sp) **Harris**

645. (245) Transistors and Integrated Circuits. Transistor characteristics, and fabrication techniques used in integrated circuits. (3Sp) **Jones**

651, 652, 653. (251, 252, 253) Feedback Control Systems. Compensation of automatic control systems. Continuous, sampled data, nonlinear, and stochastic systems. Prerequisites: Elec Engrg 615. (3W, 3Sp, 3Su) **Thurgood**

661, 662, 663. (231, 232, 233) Electromagnetic Fields and Waves. Advanced static and dynamic electric current, and magnetic field theory; Maxwell's equations; wave equations; solution of electromagnetic field and wave problems in coordinates appropriate to various wave structures; non-classical electrodynamics. Prerequisite: Elec Engrg 316 or Physics 461. Three lectures. (3F, 3W, 3Sp) **K. Baker**

670, 671. (291, 292) Statistical Communication Theory. Noise processes, statistical properties, linear and non-linear transformations; signal space, statistical detection, correlation and matched filter receivers, error probability, transmission rate, optimum receivers, efficient signaling; code implementation; channel models, capacity; modulation systems, AM, FM, PM, pulse code modulations. Prerequisites: Elec Engrg 615, Applied Statistics 640 and instructor's consent. (3W, 3Sp) **Despain, Smerage**

672. (293) Detection, Estimation, Modulation Theory. Hypothesis tests; signal detection, parameter estimation, prediction and filtering, applications to modulation and digital communication. Prerequisite: Elec Engrg 671. (3F) **Smerage**

678. (278) Seminar in Radio Science. One lecture. (1F, W, Sp) **Clark**

680, 681, 682. (275, 276, 277) Graduate Electrical Engineering Seminar. A weekly meeting of staff and graduate Electrical Engineering students. Each student prepares and presents technical papers on suitable topics. One lecture. (1F, 1W, 1Sp) **Staff**

693. (273) Special Problems in Electrical Engineering. Time and credit arranged. (F, W, Sp, Su) **Staff**

697. (298) Graduate Thesis. Credit arranged. (F, W, Sp, Su) **Staff**

699. (400) Continuing Registration. (3F, W, Sp, Su)

673. (294) Information Theory and Coding. Sources and measures of information; coding, code properties, channel models; Shannon theorems; reliable communication. Prerequisites: Applied Statistics 640 or 556 and instructor's consent. (3W) **Despain, Smerage**

674. (295) Advanced Topics in Communications Theory. Elements of game theory; pattern recognition; learning machines; new developments in decision and estimation theory, coding modulation; current topics in literature. Prerequisites: Elec Engrg 672, 673. (3Sp) **Smerage**

701, 702, 203. Aeronomy. To introduce the first-year graduate student to the physical processes operating in the Earth's high atmosphere. Topics to be covered will include composition and temperature of the atmosphere,, energy balance, atomic and molecular processes and dynamic. Emphasis will be based on the application of knowledge which the student has already acquired to solution of real physical problems. Prerequisite: Solid foundation in the physical sciences. (3F, 3W, 3Sp) **Megill**

704. Ionospheric Physics. A discussion of the observational and theoretical aspects of ionospheric physics. Topics to be covered include production and loss mechanisms for the ionozation, transport processes, and effects of ionozation, transport processes, and effects of ionospheric storms. The emphasis will be on the ionosphere above 100 km. (3F) **Peterson**

705. Atmospheric Chemistry and Photochemistry. (See Chemistry 705.)

706. Circulation of the High Atmosphere. Dynamics of the stratospheric and mesospheric circulation systems in cartesian and wavenumber space; gravity wave mechanisms above the jet stream level; large-scale circulation patterns of the stratosphere and mesosphere; sudden stratospheric warming; stratospheric transport and hemispheric mass exchange; vertical motions and enrgy transformations in the stratosphere; ozone anomsites and radiation warning. (3Sp) **Wooldridge**

793. (273) Graduate Thesis PhD. Credit arranged. (F, W, Sp, Su) **Staff**

797. (298) Special Problems in Electrical Engineering. PhD. Time and credit arranged. **Staff**

799. (400) Continuing Registration. PhD. (3F, W, Sp, Su)

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*Taught 1971-72
**Taught 1972-73

771, 712, 713. (281, 282, 283). **Electro-Optics. Systems: geometrical and physical optics; optical devices; fundamental relations, laws, units; radiometric detector response mechanisms; detection limitations; radiometric-electronic systems; Fourier optics; image formation; modulation and filtering; holography; random process and noise; information and data processing. Prerequisites: Graduate standing and instructor's consent. (3F, 3W, 3Sp) **Despain, Wyatt**

**Department of*

Elementary Education

Acting Head: Associate Professor Edith S. Shaw

Office in Education 206

Professors Bryce Adkins, Malcom Allred, Kenneth C. Farrer

Associate Professors Arthur D. Jackson, L. Gail Johnson, Jean Pugmire

Assistant Professors Joan C. Bowden, Barbara B. Howell, Jay A. Monson, Morris Mower, Ivan Pedersen, Helen Tanner, Thomas A. Taylor, R. Eyre Turner, Evelyn L. Wiggins

Instructors Mary E. Carigan, Alice Chase, Mona T. Higbee, Marjorie Rappleye

Degrees: Bachelor of Arts (BA), Bachelor of Science (BS), Master of Arts (MA), Master of Education (MEd), Master of Science (MS), Doctor of Education (EdD)

Major: Elementary Education

The function of the Department of Elementary Education is to provide leadership in the preparation of teachers, supervisors, curriculum specialists, and other professional personnel for careers in elementary education.

Undergraduate Study

Completion of the program outlined will fulfill the basic University requirements for graduation with the baccalaureate degree in Elementary Education as approved by the Office of Admissions and Records. The program of study will also fulfill the certification requirements for the basic professional teaching certificate issued by the Utah State Board of Education with authorization to teach in the elementary classrooms in the State of Utah.

Admission to the teacher education program is a requisite for enrollment in any professional education course. A student desiring admission to this program should file an application to the Office of Admissions in the College of Education. It is advisable for each student to complete this application to teacher education early in the Sophomore year. Statements of the requirements may be obtained from the office of the Department of Elementary Education.

*In College of Education.

All students majoring in Elementary Education must be registered in the College of Education. An adviser, who will provide program assistance, will be assigned from the Department of Elementary Education. Programs of professional education courses as well as courses for fields of concentration or subject matter minors have been developed by the Department of Elementary Education and approved by the Council on Teacher Education and the State Department of Public Instruction. Students should obtain from their advisers a copy of the approved programs of study for majors in Elementary Education.

In addition to the admissions procedure to the teacher education program, a student is to be admitted to a full professional quarter of student teaching by separate application. The scholastic requirement for admission to teacher education and to the professional quarter and certification is a total minimum grade point average of 2.25. Not all student teachers can be accommodated by the schools located within Cache County. Students should plan to be financially prepared to spend the professional quarter off campus in the event such an arrangement is necessary.

New Program. Students who carefully select their elective courses may also qualify for a special endorsement to the basic professional teaching certificate, or may develop an area of specialization in a subject matter field in addition to the approved field of concentration or the two subject matter minors. Examples of these areas may be Library Science as well as Child Growth and Development. Information concerning special endorsements and additional areas of specializations may be obtained from the office of the Department of Elementary Education.

Students who are completing their program of studies leading to an elementary school teaching certificate and who desire to obtain dual certification to teach in the secondary schools of Utah should consult the head of the Department of Elementary Education. In general, the additional requirements are: 1) an approved secondary major and minor or an approved composite major in a broad field of secondary school teaching, 2) six credits of student teaching in the secondary schools with its concurrent secondary curriculum seminar, and 3) three credits of special methods in the major or minor field of study. A student interested in meeting certification requirements to teach in another state should seek assistance from his departmental adviser.

Classes chosen to satisfy lower division requirements are not to be counted toward the completion of a field of concentration or the two subject minors. Elective courses approved to fill the lower division requirements are listed in the Admissions and Records section of this catalog.

The program designed to fulfill requirements leading to University graduation and to the basic professional teaching certification in Elementary Education is listed below. Students graduating after the Spring 1970 commencement will be expected to complete the following program of studies:

Requirements for a baccalaureate degree with a major in Elementary Education:

	Credits
I) Lower Division Groups	56
A) Freshman English 101, 102, 103	9
B) Natural Sciences	19

Biological Sciences
Mathematics 201, 202
Physical Sciences (other than mathematics)
(Not less than five credits in any of the above groups)

C) Social and Behavioral Sciences 15
Social Science (at least one of the following: History 170, Economics 200, or Political Science 110) 5
Psychology 101 5
Elective 5

D) Humanities 10

E) Physical Education (PE 100, 160 (W) or 162 (M) and one elective 3

II) Major in Professional Education 48

A) Group I (Understanding the Child and the School) Minimum: 15 credits
[1]Elementary Education — Principles of Elementary Education 4
[1]Psych 110 Human Development 3
[1]Psych 366 Educational Psychology .. 3
PubH 454 School Health for Elementary Teacher or PubH 455 School Health for Secondary Teacher 3
FCD 150 Early Childhood 5
Sp Ed 301 Education of Exceptional Children 3
CD 170 Language, Hearing and Speech Development 3
Psych 270 Mental Hygiene 3
[1]Sec Ed 301 Foundation Studies in Teaching 5
Sec Ed 604 Measurement and Evaluation in Education 3
Psych 351 Social Psychology 3

B) Group II (Curriculum and Methodology) Minimum: 15 credits
Elem Ed. 415 Teaching of Reading.. 3
Elem Ed 410 Teaching of Language Arts 3
Elem Ed 420 Teaching Social Studies 3
Elem Ed 425 Teaching Science 3
Elem Ed 430 Teaching Mathematics 3
Music 350 Elementary School Music for the Classroom Teacher.. 3
Art 310 Art Methods for Elementary Grades 3
PE 301 Physical Education in Elementary School
or
PE 302 Methods of Teaching Elementary School Physical Education 3

C) Group III
Additional courses from which electives may be selected to total 48 credits in professional education:
IM 541 Utilization of Audiovisual Media 3
IM 551 Production of Audiovisual Material 3
English 416 Children's Literature 3
Speech 518 Storytelling 3
Speech 522 Reading Poetry to Children 3
For Sci 410 Principles of Conservation 3
ITE 503 Industrial Arts for Elementary School 3
Th Arts 558 Creative Dramatics 3

D) Group IV (Professional Quarter) 15

[1]Required classes.

Graduate Study

At the graduate level the Department of Elementary Education in cooperation with the School of Graduate Studies offers direction in the preparation of programs leading to the MA, MEd, MS, EdD degrees and fifth-year certificate programs. Students who desire information relative to graduate programs should write to the dean of the School of Graduate Studies or to the head of the Department of Elementary Education.

Elementary Education Courses

Undergraduate

150. (new) Training of Teacher Aides. Experiences to provide insight into a variety of roles which public school classroom teachers perform and to demonstrate functions which an aide might perform to augment teacher performance in the classroom. (2F, W, Sp) **Pugmire**

301. (101) Foundation Studies in Teaching. The major purpose of this course is to examine and evaluate varying philosophies and basic principles of elementary education in the United States. Students will observe and participate in public school teaching activities as initial experiences to discover through discussions, tutorial or school group participations the meaning of teaching. (5F, W, Sp, Su) **Staff**

410. (102) Teaching Language Arts. A study of language development in children and its implication for classroom practice in listening, speaking, writing, and reading. Prerequisite: Admission to Teacher Education. (3F, W, Sp, Su) **Wiggins**

415. (107) Teaching Reading. Considers the objectives of the reading program stages of reading development, skills and attitudes to be gained, materials of instruction, and experiences of children which contribute to the achievement of the objectives in reading. Opportunities for observation of reading situations in elementary school classrooms. Prerequisite: Admission to Teacher Education. (3F, W, S, Su) **Johnson, Mower, Wiggins**

420. (108) Teaching Social Studies. Organizing the elementary curriculum to provide social studies experiences consistent with the nature of the child and the democratic society in which he lives. Prerequisite: Admission to Teacher Education. (3F, W, Sp, Su) **Allred, Monson, Shaw**

425. (109) Teaching Science. Investigation of the aims of science programs. Acquaintance with materials and techniques of instruction, and experiences that may help children gain the skills, understanding, and attitudes desirable in this subject area. Prerequisite: Admission to Teacher Education. (3F, W, Sp, Su) **Adkins, Taylor**

430. (112) Teaching Mathematics. The place of arithmetic in the elementary school curriculum: methods of teaching in several grades. Prerequisite: Admission to Teacher Education. (3F, W, Sp, Su) **Adkins, Jackson**

435. (116) Kindergarten Education. Study of the kindergarten program with emphasis on the influence of recent research in child development and human relations, curriculum, and methodology. (4F, Sp) **Bowden, Pugmire**

436. (117) Current Kindergarten Practices. A laboratory experience in a kindergarten environment. Prerequisite: Admission to Teacher Education. (3W, Sp, Su) **Bowden, Pugmire**

437. (118) Kindergarten Materials. This course is designed to give the student first-hand experience with the variety of curriculum materials now being produced for use in the kindergarten and the determination of criteria for evaluating the product of commercial materials and equipment for use in the kindergarten environment. Prerequisite: Admission to Teacher Education. (3W, Su) **Bowden, Pugmire**

440. (new) Teaching Modern Languages. Considers the objectives of a modern language program in elementary schools: stages of program development, skills and attitudes to be gained, materials of instruction, and experiences of children that contribute to the achievement of modern language instruction in intermediate grades of the public school. (3F, Sp) **A. Smith**

450. (105) Elementary Curriculum Seminar. A weekly seminar taken concurrently with the professional quarter of student teaching. Consideration given to problems arising during the teaching experience. Focus is upon planning for the nature and selection of content of the elementary school days, factors that influence teaching procedures, adaptive practices to individualize instruction, evaluation processes, and examination of current teaching materials. Prerequisite: Admission to Teacher Education. (3F, W, Sp, Su) **Staff**

460. (106) Student Teaching in Elementary Schools. For Seniors who have had a substantial amount of professional course work including Foundation Studies in Teaching, Educational Psychology, and Elementary School Methods. The apprenticeship plan is followed. **Application for student teaching must be arranged two quarters in advance of student teaching.** Elementary Education 450 to be taken concurrently.

A student enrolled in this class may be assigned by the University to work in selected public schools throughout the state; therefore, he would need to make plans to spend this quarter off campus. (12 F, W, Sp) **Staff**

465. (106A) Modified Student Teaching in Elementary Schools. For experienced teachers or individuals who have completed requirements for the secondary certificate and are preparing also for elementary school teaching. At least one-half day is required for one full quarter. The student will be assigned to a sponsor teacher in the campus laboratory school or in the public schools. Elementary Education 450 must be taken concurrently. (6F, W, Sp) **Staff**

466. (106B) Modified Student Teaching in Elementary Schools. For experienced teachers or individuals who have completed requirements for the secondary certificate and are preparing also for elementary school teaching. At least one-half day is required for a summer session or part of a quarter. The teacher will be assigned to a sponsor teacher in the campus laboratory school or in the public schools. Elementary Education 450 must be taken concurrently. (3Su) **Staff**

507. (252) Aerospace Education. See Secondary Education 507. (3Su)

Graduate

615. (204) Foundations of Curriculum Development. Designed for experienced teachers. Course deals with new concepts in elementary curriculum designs and materials. New methods examined. (3F, Sp, Su) **Allred, Farrer, Monson, Shaw, Wiggins**

620. (205) Improvement in Kindergarten Education. An advanced course in kindergarten education for experienced teachers. Includes an evaluation of the kindergarten program

based upon the latest research in the areas of psychology, child development, education, and sociology. (3W, Su) **Pugmire**

621. (212A) Workshop in Kindergarten Education. Intensive full-day workshop scheduled following the close of public school year. Design will follow the regular year's programming of Elem Ed 620. (3Su) **Bowden, Pugmire**

625. (210) Workshop in Science Education. Examination of new conceptual framework in science with emphasis upon teaching strategies to promote effective use of current materials. Usually scheduled immediately following close of public school year. (3Su) **Adkins**

630. (212) Workshop in Mathematics Education. Intensive program for short-time interval following close of public school year or during Christmas vacation. Examination of structure of mathematics as adopted for instruction in elementary schools with particular emphasis upon kindergarten and primary grade content. (3Su, W) **Adkins**

635. (213) Diagnosis of Reading. For teachers, supervisors, and other interested school personnel in remedial reading instruction. Concerned with causes of reading, diagnostic tests, and procedures used in remedial reading. Prerequisite: Elem Ed 415 or two years of successful teaching experience in the elementary school. **(3F, Su) Johnson, Mower**

636. (214) Remedial Teaching Instruction. Designed to follow Elem Ed 635. Considers the nature of remedial reading instruction, practices in selection of remedial students, group and individual instruction, and methods and materials used in remedial reading programs. (3W, Su) **Johnson, Mower**

637. (216) Practicum in Remedial Reading. Designed to follow 635 and/or 636. Provides opportunity for the students to work with children in need of remedial help in reading. Enrollment only with the consent of the instructor. (3W, Sp, Su) **Johnson, Mower**

640. (219) Current Problems in Elementary Education. Considers those areas of elementary curriculum in which members of the class desire current, authoritative points of view. Opportunity for both individual and group work. (3W, Su) **Allred, Jackson, Johnson, Monson**

645. (220) Creative Education in Elementary Schools. Exploration of research concerning creativity in education relating to teaching processes and attitudes for utilizing basic principles in the improvement of classroom practice. (3W, Su) **Farrer, Shaw**

656. (201) Practicum in Improvement of Instruction. Designed as an in-service training course for experienced teachers and administrators. Emphasis is given to evaluating and improving the educational program in a particular school or school district as a result of faculty needs assessment. (3F, W, Sp) **Staff**

660. (224) Improvement of Art Instruction. For experienced teachers. Considers newer concepts in curriculum and methods of instruction in art education for elementary school children. (3Su) **Staff**

665. (225) Improvement of Reading Instruction. Emphasizes components of an adequate developmental reading program, with emphasis upon procedures for helping the child who is having general reading difficulties. Prerequisite: Elem Ed 415 or teaching experience in elementary school. (3F, Sp, Su) **Johnson, Mower**

670. (226) Improvement of Science Instruction. For experienced teachers. Considers new concepts in curriculum and methods of instruction in science in the elementary schools. Prerequisite: Elem Ed 425 or teaching experience in elementary school. (3W, Su) **Adkins, Taylor**

675. (227) Improvement of Mathematics Instruction. For experienced teachers. Considers new concepts in curriculum and methods of teaching mathematics in the elementary school. (3Sp, Su) **Adkins, Taylor**

680. (228) Improvement of Social Studies Instruction. For experienced teachers. Emphasis placed upon study of newer concepts in curriculum and methods of instruction of the elementary school studies programs. Prerequisite: Elem Ed 420 or teaching experience in elementary school. (3F, Su) **Allred, Monson, Shaw**

685. (229) Improvement of Language Arts Instruction. For experienced teachers. Examination of research in new linguistic learnings and processes of teaching the language arts program in the elementary school. (3Sp, Su) **Wiggins**

693. (283) Readings and Conferences. (Master's level) Provides opportunity for individually directed study in subject of special interest and preparation. Credit arranged. (F, W, Sp, Su) **Staff**

697. (285) Research and Thesis Writing. (Master's level) Research and thesis writing with guidance and criticism. Credit arranged. (F, W, Sp, Su) **Staff**

698. (new) Research Consultation. Continued advisement for candidates for master's degrees. Credit arranged. (F, W, Sp, Su) **Staff**

699. (new) Continuing Registration. Enrollment required of master's candidates not enrolled for other course work or conference activity but who desire availability of resources and library facilities. Credit arranged. (F, W, Sp, Su) **Staff**

712. (259) Student Teaching Supervision. Considers ways and means of providing desirable experiences for student teachers in the public schools. The role of the classroom teacher and the college supervisor will be analyzed. Credit arranged. (F, Su) **Drake, Shaw**

715. (366) Internship in School Supervision. See Secondary Education 715. Credit arranged. (F, W, Sp) **Drake**

793. (new) Readings and Conferences. (Doctor's level) Provides opportunity under committee chairman for individually directed study in special area of research interest. Credit arranged. (F, W, Sp, Su) **Staff**

797. (385) Field Studies and Thesis. Individual work on research problems in the EdD program. Emphasis placed upon writing and editorial techniques. Credit arranged. (F, W, Sp, Su) **Staff**

798. (new) Research Consultation. Continued advisement for candidates for the doctor's degree. Credit arranged. (F, W, Sp, Su) **Staff**

799. (400) Continuing Registration. Enrollment required of doctoral candidates not enrolled for other course work or conference activity but who desire availability of human resources and library or electronic facilities. Credit arranged. (F, W, Sp, Su) **Staff**

**Department of*

English and Journalism

Head: Associate Professor Reed C. Stock
Office in Library 420

Professors T. Y. Booth, Austin E. Fife, J. Lynn Mortensen, Veneta L. Nielsen, John M. Patrick, Moyle Q. Rice, John J Stewart

Professors Emeritus Carlton F. Culmsee, Hubert W. Smith

Associate Professors DelRae Christiansen, Kenneth B. Hunsaker, H. B. Kulkarni, Marlan Nelson, Dean O. Skabelund

Assistant Professors JR Allred, Jarvis Anderson, Theodore Andra, Richard J. Andre', Coralie M. Beyers, William E. Carigan, Zenna Beth Crockett, Patricia Gardner, John Lackstrom, Thomas J. Lyon, John Scherting, Ronald W. Smith, Eugene Washington, Mary Washington

Instructors Jean Andra, Kenneth W. Brewer, Barbara Chang, Carolyn Fliss, Bruce Hadfield, James A. Hamby, Alice Hart, Kristian Koford, Idella Larson, Shirlene Mason, Stephen May, Caroline Patrick, Andrea L. Peterson, Douglas Regier, Roberta Sorensen, Glenn Wilde

Degrees: Bachelor of Arts (BA), Bachelor of Science (BS), Master of Arts (MA)

Majors: English, English Teaching, American Studies, Journalism

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*In College of Humanities, Arts and Social Sciences.

The English and Journalism program is designed to meet the ever-increasing demand for English-trained personnel in mass communications, industrial writing and editing, graduate schools, public relations work, and teaching.

Undergraduate Study

English Major

To graduate with a major in English, the student must complete the prescribed program of the department, and in addition must either qualify for the Bachelor of Arts degree by achieving a two-year level of competency in a foreign language (p. 32), or qualify for teacher certification (p. 48). The student may, of course, elect to do both of the latter, and is encouraged to do so; experience with another language gives an additional dimension of language understanding which perhaps can be gained in no other way, and the two-year competency is necessary for a graduate degree in English; most English majors become teachers, and the program for certification can be helpful to the teacher at any level. By careful planning, both the arts degree and certification can be gained in the four academic years.

Through his English program the student is expected to achieve the following at a level appropriate to baccalaureate training: 1) competency in English composition, 2) insight into the nature of both the English language and language as a generic concept, and 3) experience in and understanding of literature.

Specifically, for the Bachelor of Arts degree the student will complete 50 credits in English including 409, 410, 421, 510; at least three credits in advanced composition (301, 401, 501); and 32 to 35 credits in literature courses, mainly in English and American literature, but including some world literature, and including some work in each of poetry, fiction, drama, and essay. Courses may be selected from 216, 217, 251, 260, 261 (not more than 10 credits, but that much recommended), and the department's upper division offerings. The lower division classes and English 421 should be taken before embarking on upper division work in literature.

To qualify for the teacher major in English, the student will complete the same program except that it must include 401 and 417. An "application for admission to teacher education" should be completed before the beginning of the Junior year.

In addition, the student qualifying for certification should keep continually in mind the professional work for which he is preparing. For example, he should note teaching techniques which seem to him particularly effective and should consider, in the light of his educational training, how they might be adapted to various age and competency levels; and he should continue to work on his oral competence as well as on his writing and understanding of literature. For his humanities group fillers he is urged to elect Speech 101 or 104 and Philosophy 101 or 210 (and for electives Theatre Arts 466 and Journalism 504). An understanding of some fundamentals of United States institutions is required of all USU graduates; one or more courses in English history are also useful to the English major.

English Teaching Minor

In addition to the Freshman English and general education

requirements, the student must complete a minimum of 24-27 credits in English as follows:

A) Lower Division (10 credits): 251, and either 260 or 261.

B) Upper Division (8-11 credits): 517 or 544; 548, 578, 579, or 580; 587 or 588.

C) Technical (six credits): 401 and 410.

Students are encouraged to supplement these required courses with courses in world literature.

Any deviation from this plan must have the approval of the head of the English Department or one of the departmental advisers.

The American Studies Major

The American Studies major is designed to cultivate a broad understanding of American culture and its antecedents. It emphasizes the interrelationships that exist in American literature, history, institutions, philosophy, and arts. In addition to offerings in the Humanities and Arts, it includes courses from the Social Sciences. The following course of study is recommended:

A) A minimum of 36 credits in English, American, and World Literature from the following or other approved courses: 216, 217, 251, 260, 261, 356, 525, 531, 536, 537, 538, 539, 541, 544, 548, 552, 553, 556.

B) A minimum of 16 credits in History, including courses 170 and 541. Additional upper division American History courses may be selected.

C) A minimum of 11 credits in Political Science, preferably 110, 440, 531, 532, 533.

D) A minimum of six credits in other approved areas.

E) A minimum of 24 credits in a foreign language approved by the Chairman of the American Studies Committee.

A student majoring in American Studies is not required to complete a minor. Consult Professor John Scherting to have a course of study approved.

Graduate Study

Master of Arts Degree. The Department of English offers programs leading to the Master of Arts in English and in American Studies. In each of these fields, two programs are available. The first consists of 45 credits (of which at least 20 credits, exclusive of thesis, must be in courses numbered 600-699), including a thesis for which 10 credits are given. The second program also consists of 45 credits, but instead of a thesis the candidate must complete at least 30 credits of work in the courses numbered 600-699 and file at least two approved seminar papers with the School of Graduate Studies. All candidates take a final oral examination of approximately two hours' duration, covering the material of their undergraduate and graduate programs. The focus will be on the thesis for those who have written one.

The following requirements of the graduate program are presented only in summary. The student should consult the USU Graduate Catalog for further explanations and more detailed regulations.

To complete the degree, the candidate must: 1) file an application for admission to graduate study with the School of Graduate Studies, and, upon acceptance, consult with the chairman of the departmental graduate committee,

Dr. DelRae Christiansen, Library 426; 2) take the Graduate Record Examination given by the School of Graduate Studies during the first quarter in residence; 3) take, during the first quarter in residence, a departmental preliminary examination in the field of English or American Studies; 4) select, in consultation with the head of the English Department and the chairman of the departmental graduate committee, one of the two programs leading to the degree and be assigned a major professor and a committee; 5) complete English 601 (American Studies majors must also take one of the following: Engish 586, 609, 611, or 612); 6) complete satisfactorily the additional required course work outlined by his major professor; 7) pass an examination on 15 books recommended by the English Department at least one month before the final oral examination; 8) file with the departmental graduate committee a statement of language proficiency in the language offered for the degree, from the Department of Languages; 9) present an acceptable thesis, or, if the alternate program is selected, complete the necessary additional credit in courses numbered 600-699 and submit the required seminar papers; 10) pass a comprehensive oral examination.

Master of Arts Degree in American Studies. Candidates for the master's degree in American Studies are required to present a bachelor's degree with American Studies, English, History, or Political Science as a major. The course of study will be arranged in consultation with a member of the American Studies Committee and is subject to approval by the chairman of the committee. The emphasis in graduate work will be largely governed by 1) the student's cultural and professional objectives and 2) his undergraduate course work.

Total credit and examination requirements are in general the same as those for the master's degree in English. However, the departmental qualifying examination will be administered by the American Studies Committee and will cover primarily American Literature, American History, and American Political Institutions.

The student will be required to demonstrate proficiency in a foreign language, usually French or German, the proficiency to be determined by the head of the Department of Languages.

Courses to fill the requirements for the master's degree in American Studies can be selected from relevant courses offered by the departments of English, History, and Political Science. The student should consult with the director of the American Studies program for assistance in scheduling the courses.

Ten additional credits may also be drawn from upper division courses in the following subject matter fields: English and Comparative Literature, English and World History, Philosophy, Art, Music, Sociology, and Economics. All students must take at least **one** of the following: English 586, 609, 611, 612.

In American Studies, as in the regular English program, the student may elect an alternate plan which requires a minimum of 45 credits of which at least 30 must be in courses numbered 600-699.

Assistantships. Some teaching assistantships are available for students who qualify as master's candidates in the English Department. Send application to the head of the English Department.

English Courses

Undergraduate

1. English. Required of students whose ACT score and high school performance record indicate a need for further work before attempting college-level English. Students must obtain a passing grade in this course before they will be admitted to English 101. (Non-credit) **Staff**

101, 102, 103. (1, 2, 3) English. Required of all Freshmen and of all transfer students who have not completed an equivalent program. The student must pass 101 before taking 102 or 103. Designed to bring the skills of students in writing and reading to a level acceptable for college work. (3 each) **Staff**

104, 105. (12A, 12B) Practice in Composition. (2 each) **Staff**

109. (4) Elements of Grammar. (3) **Staff**

110. (5) Vocabulary. A study of word formation and derivation as a means of understanding scientific terms and of increasing vocabulary. (3) **Staff**

113, 114, 115. (14, 15, 16) English for Foreign Students. See Language Department, English 113, 114, 115. (3 each) **Staff**

116. (31) Introduction to Drama. (3) **Anderson**

117. (32) Introduction to Poetry. (3) **Lyon**

118. (33) Introduction to the Short Story. (3) **Carigan, Rice**

119. (37) Introduction to the Novel. (3) **Staff**

120. (34) Great Books and Ideas. Man's ideas about himself, the universe, and the divine. (3) **Nielsen, Rice, Skabelund**

121. (35) Great Books and Ideas. Man's ideas about social relationships. (3) **Nielsen, Rice, Skabelund**

122. (36) Great Books and Ideas. Man's ideas about the modern world. (3) **Nielsen, Rice, Skabelund**

(Courses 120, 121, 122 are related but they are taught as independent units and need not be taken as a series.)

124. (81) Introduction to Folklore. (3) **Fife**

126. (43) Readings in Mythology. (3) **Staff**

131. (48) Modern European Literature. (3) **Staff**

216. (40) World Literature Before 1650. (5) **Nielsen, R. Smith**

217. (41) World Literature From 1650 to the Present. (5) **Kulkarni, Nielsen**

236. (53) American Literature, Early Period. (5) **Staff**

251. (50) American Literature. (5) **Staff**

253. (58) Modern American Literature. (3) **Staff**

260. (60) English Literature, Early Period. (5) **Staff**

261. (61) English Literature, Late Period. (5) **Staff**

263. (68) Modern British Literature. (3) **Kulkarni**

301. (112) Expository Writing. Concerned with theory, examples, and practice of general expository writing. Emphasizes organization, paragraph development, diction, and revision. Open to all upper division students and others by permission of instructor. Prerequisites: English 101, 102, 103. (3) **Staff**

303. (111) Technical Writing. Effective communciation of ideas via the technical report and the scientific article. For students of Forestry and the Natural Sciences. Others admitted only with consent of instructor. Prerequisites: English 101, 102, 103. (Needs of students majoring in Arts, Letters, Education, Business, or the Social Sciences are met by English 301. Students of Engineering are directed to English 305. (3) **Anderson, Booth**

305. (113) Engineering Reporting. Instruction in style, forms, and techniques of engineering reporting. Open only to students registered in the College of Engineering. (Students majoring in Physical Sciences may be admitted with consent of instructor.) Prerequisites: English 101, 102, 103. (3) **T. Andra, J. Patrick**

356. (154A) Readings in Individual American Authors. (2) **Staff**

385. (165) Readings in Individual English Authors. (2) **Staff**

401. (110) Composition for Teachers. Principles of effective composition and extensive practice in composition: composition techniques; evaluation of professional and student work in both discussion and demonstration. Prerequisites: English 101, 102, 103. (3) **Hunsaker, Mortensen**

409. (102) Introduction to Language. History, development, and acquisition of language; dialectology. (3) **Mortensen**

410. (104) Grammar. Designed for teachers. (3) **Mortensen**

412. (103) Language Structures. Syntax, phonology, morphology and semantics for the elementary school teacher. Prerequisite: English 409. (3) **Gardner**

416. (122) Children's Literature. Prose and poetry of children to the junior high school age. (3) **Mortensen**

417. (123) Literature for Adolescents. Prose and poetry of the high school age. (3) **Mortensen**

421. (100) Introduction to the Professional Study of English. Required of English majors; open to English minors. (3) **Staff**

492. (115) Senior Practicum. (1) **Crockett**

501. (117) Creative Writing. Admission by consent of the instructor. Prerequisites: English 101, 102, 103. (3) **Culmsee, Beyers, Nielsen, Rice**

510. (105) Studies in Linguistics. Analysis of language structure from phonemes to connected discourse. Evaluation of various descriptive systems: traditional, structural, transformational-generative. Prerequisite: English 410. (3) **Lackstrom, Mortensen**

517. (132) Readings in Poetry. An analytical approach to techniques, traditional and modern, and major thought currents of the poetry expressing the 20th century in relation to backgrounds both old and new. (3) **Nielsen**

521. (134) Literary Criticism. An analytical rather than historical approach to criticism intended to deepen the student's insight into the nature and purpose of the forms of literature, and to develop literary taste and judgment. (3) **Patrick**

522. (182) Ballads and Folk Songs. (3) **Fife**

523. (183) American Folklore. (3) **Fife**

524. (187) Regional Folklore of the Intermountain West. (3) **Fife**

525. (142) The Bible as Literature. A survey of the major writings from the Hebrew tradition in the King James version of the Old and New Testaments. (3) **Rice**

528. (140) Greek Literature. Masterpieces of Greek literature, with emphasis upon drama. All readings in English translation. (5) **Stock**

529. (141) Roman Literature. All readings in English translation. (3) **Stock**

531. (147) Comparative Literature, Medieval and Renaissance. (3) **Staff**

532. (148) Comparative Literature, Seventeenth and Eighteenth Centuries. (3) **Staff**

533. (149) Comparative Literature, Nineteenth and Twentieth Centuries. (3) **Staff**

534. (129) Modern Continental Drama. (3) **Anderson**

536. (155) The Colonial Period in American Literature. (3) **Beyers**

537. (156) The Age of Reason in American Literature. Eighteenth-century American writing, with particular emphasis on the impact of deism on literary, political, and religious thought. Concentration on such writers as Mayhew, Wise, Edwards, Franklin, Jefferson, Paine, Freneau, Brackenridge, Tyler and Rush. (3) **Scherting, H. Smith**

538. (157) The American Literary Renaissance. The rise of social, political, philosophical, and religious liberalism and idealism as reflected by authors from Irving to Whitman, with special emphasis on the transcendentalist movement. (3) **Scherting, H. Smith**

539. (158) Late Nineteenth-Century American Literature. The turn late in the 19th century to realism and naturalism. (3) **Hunsaker, H. Smith**

540. (new) Twentieth-Century American Literature. (5) **Hunsaker**

541. (153) Western American Literature. (3) **Lyon**

544. (150) American Poetry. (3) **Hunsaker**

548. (151) American Fiction. (3) **Culmsee, Hunsaker, H. Smith**

552. (126) American Drama to 1900. (3) **H. Smith, Scherting**

553. (127) Modern American Drama (3) **H. Smith, Scherting, Anderson**

556. (159) Critical Study of Individual American Authors. Each course is an intensive study of the major works of one author with special concern given to matters of text, bibliography, and significant critical writings about the author's work. Open only to upper division and graduate English majors and to others by consent of the instructor. (2) **Staff**

561. (166) Medieval English Literature. A study of English literature from the beginnings to the Renaissance. Earlier works that present linguistic difficulty will be studied in translation. (5) **Stock**

562. (171) The English Renaissance. A study of English literature of the 16th century and its continental backgrounds. (5) **Skabelund**

563. (175) Seventeenth-Century Literature. (5) **Stock**

564. (180) Eighteenth-Century Literature. (5) **E. Washington**

565. (190) Romantic Period. (5) **J. Patrick**

566. (191) The Victorian Period. (5) **Booth, Christiansen**

567. (192) Twentieth-Century British Literature. (5) Kulkarni

578. (137) English Novel, Eighteenth Century. (3) Christiansen, E. Washington

579. (138) English Novel, Nineteenth Century. (3) Booth, Christiansen

580. (139) British Novel, Twentieth Century. (3) Christiansen

582. (124) English Drama to 1660. (3) Anderson

583. (125) English Drama 1660-1890. (3) Anderson, Booth

584. (128) Modern British Drama. (3) Anderson

585. (167) Critical Studies of Individual English Authors. Each with special concern given to matters of text, bibliography, and significant critical writings about the author's work. Open only to upper division and graduate English majors and to others by consent of the instructor. (2) Staff

586. (162) Chaucer. (3) Staff

587. (163) Shakespeare — Comedies and Histories. (3) Anderson, Patrick

588. (164) Shakespeare — Tragedies. (3) Anderson, Patrick

589. (170) Milton. (3) Rice, Stock

595. (199) Readings and Conferences. Any quarter. Students must have the approval of the head of the department. Credit arranged.

Graduate

601. (201) Bibliography and Methods. Required of all candidates for the master's degree in English. (3) Stock, E. Washington

609. (205) History of the English Language. (3) Staff

611. (209) Anglo-Saxon. Required of all candidates for the master's degree. (3) Staff

612. (261) Readings in Middle English. (3) Staff

616, 617, 618. (202A, 202B, 202C) Problems in Teaching Freshman English. Required of all teaching assistants. (1 each) R. Smith

621. (234) Seminar in Modern Criticism. Critical theories and methods of significant 20th-century English and American literary critics including T. S. Eliot, I. A. Richards, Cleanth Brooks, R. P. Warren, William Empson, Kenneth Burke, and others. (3) Kulkarni, Patrick

636. (251) The Puritan Mind. (3) Staff

637. (251) The Impact of Deism. (3) Staff

638. (251) Democracy and Religious Diversity in Colonial America. (3) Staff

639. (252) The Nineteenth Century New England Circle. (3) Staff

640. (252) Romanticism and Regionalism in the Nineteenth Century. (3) Staff

641. (252) The Rise of Realism and Naturalism in Nineteenth Century American Literature. (3) Staff

642. (253A) Modern American Poetic and Critical Schools. (3) Staff

643. (253A) Modern American Fiction and Drama. (3) Staff

644. (253A) Influences of Science and Philosophy on Modern American Literature. (3) Staff

662. (271) The English Renaissance. (3) Staff

663. (275) English Literature, Seventeenth Century. (3) Stock

664. (280) English Literature, Eighteenth Century. (3) E. Washington

665. (290A) English Literature, the Romantic Period. (3) Staff

666. (290A) English Literature, the Victorian Period. (3) Staff

667. (290A) English Literature, Twentieth Century. (3) Staff

680. (295) Proseminar. (2) Staff

682. (265a) Seminar. (3) Staff

693. (302) Teaching of College English. (3) Staff

695. (299) Independent Study. Time and credit arranged. Staff

699. (400) Continuing Registration. Time and credit arranged. Staff

Journalism

The program leading to a Bachelor of Arts or Bachelor of Science degree in Journalism is designed to equip the student with an adequate set of professional values, to provide a broad background in the Humanities and Social Sciences, and to provide adequate training skills and techniques that will prepare the student for a career in journalistic work.

A major in Journalism with options in News-Editorial, Advertis-

ing, Radio-Television News, Public Relations and Journalism Education (Journalism Teaching) is offered through the Journalism program. All Journalism majors are required to complete a core curriculum plus courses in a concentrated sequence.

Two years of a foreign language are suggested but not required. Journalism majors should consult Professor Marlan D. Nelson, Journalism adviser, Main 133-C.

Core Courses: Journalism 121, 230, 231, 303, 333, 403, 503; plus one sequence.

Advertising Sequence: Journalism 350, 431; Art 102, 131; Business Administration 454, 458, 550.

News-Editorial Sequence: Journalism 330, 331, 332, 350, 352, 430, and three credits of electives in Journalism. Art 140 is a recommended elective two upper division courses in each of two departments as follows: History, Political Science, Psychology, Sociology. Suggested elective courses include: upper division Literature, Social Sciences, Business Administration, Languages or in an area of concentration to prepare for a writing specialization.

Public Relations Sequence: Journalism 330, 331, 332, 350, 352, 430, and 431; Business Administration 458, 550; Psychology 349, 555; Sociology 350.

Radio-Television News Sequence: Journalism 330, 431; Speech 181, 185, 581, 583, 585.

Journalism Teaching Major

Journalism Education Sequence: Journalism 330, 331, 332,, 350, 430, 504, plus five credits selected from Journalism 310, 431. The student must also complete a minimum of 25 credits in a teaching minor. Art 140 is recommended as a complement to the major. The minor should be selected from courses which are required in all Utah high schools. Professional courses in Education for certification are listed under the College of Education.

Journalism Minor

A minor in Journalism consists of 18 credits. Required courses are Journalism 121, 230, and 403. In addition, the student should select eight credits from Journalism 231, 310, 350, 352, 430, 431, 504.

Journalism Teaching Minor

A student who wishes to be certified in Journalism as a minor field must complete a minimum of 25 credits as follows: Journalism 121, 230, 231, 330, 350, 403, 430, and 504. Teaching minors are also encouraged to take at least two quarters of practice on the staff of Student Life.

Journalism Courses

100. (1) College Journalism. For members of Student Life staff. Discussion of newspapers and responsibilities of journalism. Up to three credits permitted. (1) **Nelson**

120. (10) Critical Analysis of the Newspaper. Study of significant current news practices and their relation to society; attention given to methods of news analysis and comment. (2) **Staff**

121. (12) Introduction to Mass Communications. Lectures on historical, social, and vocational aspects of the newspaper, magazine, book, radio, television, motion picture, public relations, advertising, journalism teaching; also, the psychology of news. (3) **Hadfield, Nelson**

230. (13) Reporting. Emphasis on newspaper style, social responsibilities, and problems of reporting. Practical experience in laboratory work. (5) **Nelson**

231. (14) Editing and Copy Reading. An introduction to news editing and copy reading. Basic elements of newspaper style; newspaper usage, improvement of news presentation. Lecture and laboratory work. (3) **Hadfield**

300. (2) College Journalism. For members of the editorial staff of Student Life. Conferences on student newspaper. Prerequisite: junior standing. May be taken three times. (1) **Nelson**

303. (91) Community Newspaper. Problems of editing and publishing a community newspaper. Efforts are made to provide laboratory experience in a community newspaper. Field trip required. (3) **Nelson**

310. (166) Journalism Practices. Laboratory work in publications, radio or television. (2) **Nelson**

311. (92) Newspaper Internship. Six or more weeks work in the summer on a newspaper. Prerequisite: junior standing and major or minor in journalism. Time and credit arranged. **Staff**

330. (113) Reporting — Public Affairs. Coverage of local, state, federal courts; municipal, state, and federal government administration in the local community. Laboratory work included. Prerequisite: Journalism 230. (3) **Staff**

331. (114A) Copy Editing. Continuation of Journalism 231. Study of advanced principles of editing, make-up and editorial policies involved in the editing process. Laboratory work included. Course must be taken for three quarter sequence. (1 each) **Nelson**

332. (125) Editorial Writing. Study of the editorial and its place in opinion formation in the mass media. Planning, researching, and writing editorials and editorial campaigns. Lecture and laboratory work. (2) **Nelson**

333. (126) Law of the Press. Principles of the law of libel, privacy, copyright, press freedom and responsibility as they apply to the news media. (2) **Staff**

350. (150) Publishing Problems. Study of production and business sides of newspaper publishing. Designed to familiarize the student with plant equipment, expenses of publishing a paper, sources of income, circulation and advertising problem, and labor problems. Prerequisite: Journalism 230. (3) **Nelson**

351. (156) Advertising Copy. An overview of advertising. Stresses advertising appeals and copywriting. (3) **Hadfield**

352. (164) Public Relations. Media and methods used in public relations work as required by corporations, public institutions, service organizations, and governmental agencies. Prerequisites: Journalism 230 and 231, or instructor's consent. (3) **Hadfield**

403. (199) Senior Seminar. Investigation of current problems in journalism; introduction to elementary research methods in journalism; study of selected books on journalism. Required of all Journalism seniors. (2) **Nelson**

410. (185) Special Problems in Journalism. Credit arranged. **Nelson**

430. (112) Magazine Article Writing. Lectures and practice in preparing feature articles for magazines. Analysis of periodical markets. (3) **Staff**

431. (184) TV Writing. Writing and editing news, drama, and other television material. (3) **Allen**

***503. (106) American Mass Media and Propaganda.** Development of American publications and electronic means of disseminating information and propaganda; also, main currents in thought conveyed by these mass media. (5) **Staff**

504. (191) School Publications. For the high school teacher or prospective high school teacher. Problems of advising staffs of school newspapers, yearbooks, and magazines. (3) **Staff**

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*Taught 1971-72.

*Department of

Family and Child Development

Head: Professor Don C. Carter

Office in Family Life 215

Professor C. Jay Skidmore

Associate Professors Carroll C. Lambert, Dorothy B. Lewis, Jay D. Schvaneveldt

Instructors Claudia Fuhriman, Jane Mecham, Blain R. Morgan, Loa Thomson

Lecturer Alison Thorne

Regional Training Officer for Head Start Sally Miner

Degrees: Bachelor of Science (BS), Master of Science (MS)

Majors: Child Development, Marriage and Family Relations

Social and technological changes taking place in our society give emphasis to the importance of study in child development and the family. Majors in Child Development and in Marriage and Family Relations are offered at both the graduate and undergraduate level. The current emphasis on compensatory education for young children adds to the importance of both majors.

Students who major in Child Development include practice teaching in the Child Development Laboratory as part of their program of studies. The laboratory provides opportunity to study the behavior of young children and methods of teaching. The practice teaching experience in the laboratory is also available for students who minor in Child Development.

Undergraduate Study

Child Development Major. The curriculum for a major in Child Development includes:

Courses		Credits
FCD 150	Early Childhood	5
FCD 270	Guidance of the Young Child	3
FCD 390	Concept and Perceptual Development	3
FCD 470	Preschool Methods and Curriculum	3
FCD 475	Practical Teaching in the CD Lab	6
Approved Electives		

The student who majors in Child Development may select his own minor. For those interested in a liberal or general education, the minor may be taken in any department, or approved combination of departments in the University. However, a minor in such areas as Communicative Disorders, Social Work, or Special Education will provide strong support for the major.

Early Childhood Education. The department is cooperating with Elementary Education in the certification program in Early Childhood Education. Faculty advisers in either department can provide information regarding this certification program.

Child Development Minor. The curriculum recommended for stu-

*In College of Family Life.

dents who wish to minor in Child Development includes:

Courses		Credits
FCD 150	Early Childhood	5
FCD 270	Guidance of the Young Child	3
FCD 390	Concept and Perceptual Development	3
FCD 470	Preschool Methods and Curriculum	3
FCD 475	Practice Teaching in the CD Lab	6

The minor is recommended for students who, in anticipation of their own role as parents, are interested in the growth and development of children. It is also recommended for those in such fields as Disorders, Special Education, and others in which knowledge of normal development in childhood may serve as a foundation for understanding the child with developmental or behavioral disorders.

Marriage and Family Relations Major. The curriculum for a major in Marriage and Family Relations includes 40 credits selected from:

Courses		Credits
FCD 150	Early Childhood	5
or		
FCD 210	Human Growth and Development	3
FCD 320	Marriage	3
FCD 340	The Family in Its Social Setting	3
FCD 370	Marriage Counseling	3
FCD 420	The Family in the Middle and Later Years	3
FCD 440	Family Life Education	3
FCD 450	Adolescence and the American Family	3
Approved Electives in Family and Child Development and related departments		20

Marriage and Family Relations Minor. The curriculum recommended for a minor includes:

Courses		Credits
FCD 150	Early Childhood	5
or		
FCD 210	Human Growth and Development	3
FCD 320	Marriage	3
FCD 340	The Family in Its Social Setting	3
FCD 370	Marriage Counseling	3
FCD 420	The Family in the Middle and Later Years	3
FCD 440	Family Life Education	3
Approved Electives		6

Counseling Service. The Department of Family and Child Development provides premarital, marriage and family counseling as part of a University-wide counseling program under the direction of the Coordinator of Counseling Services. Application for counseling on such problems as mate selection, husband-wife relationships, and parent-child relationships may be made to the department or to the Coordinator of Counseling Services.

Graduate Study

At the graduate level, programs are offered leading to the MS degree in either Child Development or Marriage and Family Relations. Individualization of emphasis may be provided by the selection of courses in such departments as Education, Psychology, and Sociology, as well as the other departments in the College of Family Life.

Family and Child Development Courses

Undergraduate

120. (20) Marriage and the American Family. Influence of social changes on patterns of courtship, marriage and family living (3F, W, Sp) **Morgan, Schvaneveldt, Skidmore**

150. (67) Early Childhood. Fundamentals of growth and development of the child from conception until six years of age. Family and cultural influences on the child. Emotional, cognitive, and beginning concepts of guidance. Observation experience in the Child Development Laboratory. (5F, W, Sp, Su) **Fuhriman, Mecham, Morgan Schvaneveldt, Thomson**

210. (100) Human Growth and Development. General behavior patterns characteristic of different levels of maturity; individual differences and needs. Prerequisites: Psychology 101 and FCD 150. (3F, W, Sp) **Carter**

270. (108) Guidance of the Young Child. Development of a guidance philosophy; guidance principles and techniques of behavior reinforcement and modification. Lectures and laboratory observations. Prerequisite: FCD 150. (3F, W, Sp) **Lewis, Mecham**

320. (120) Marriage. Engagements; marriage relationships; understanding of self. For men and women. (3F, W, Sp) **Carter**

****330. (135) Early Childhood and Deprivation.** Effects of deprivation on the preschool child and his family. Compensatory programs for economic deprivation: Project Head Start and the deprived child. (3F, Sp) **Carter**

340. (140) The Family in its Social Setting. Meaningful interaction with environment, including creativity. Influences of our technological, affluent culture. Environments of poverty. (3F, W, Sp) **Thorne**

350. (109) Play-School Education. Methods and materials for play-school in high school home economics programs. Laboratory experience in working with preschool children in play-school situations. Prerequisite: FCD 150. Limited to students in Home Economics Education. (5F, W, Sp) **Lewis**

370. (180) Marriage Counseling. Philosophy, principles, and techniques of premarital and marriage counseling. (3F) **Skidmore**

380. (77) The Child from Six to Twelve. Growth and development of the normal child. Guidance principles implicit in the normal behavior of these children at these age levels. Observation experience. Prerequisite: FCD 150. (3F) **Lewis**

390. (172) Concept and Perceptual Development. The use of facilities, materials, and equipment in the Child Development Laboratory to teach concept and perceptual development in young children. Prerequisite to teaching in the Child Development Lab. (3F, W, Sp) **Staff**

397. (197) Honors Studies. See Family Life 397. Credit arranged. (F, W, Sp, Su) **Staff**

420. (185) The Family in the Middle and Later Years. Family development, and problems of grown children and their parents; parents on their own; understanding older family members. (3W) **Skidmore**

430. (115) Growth of the Infant. Readings in child development from conception to fifteen months of age, with discussion of infant care. Prerequisite: FCD 150. (3W) **Lewis**

440. (125) Family Life Education. Study of parent teacher and community needs in relation to problems of education for family life. In-service training for teachers and group leaders in family. (3Sp) **Skidmore**

450. (155) Adolescence and the American Family. The physiological and social-psychological aspects of becoming and being an adolescent. The family is focused as the framework for passing through and experiencing adolescence. Cultural expectations of adolescence and consequences of the adolescent stage in relationship to the family, school, and community. The peer group as a major force. (3F, Sp, Su) **Schvaneveldt**

470. (174) Preschool Methods and Curriculum. Appropriate curriculum for the preschool child; philosophy of child growth and development. Must accompany FCD 475. (3F, W, Sp, Su) **Lambert**

475. (175) Practice Teaching in Child Development Lab. Required of all students who major or minor in Child Development. For juniors or seniors who have had a substantial amount of course work. Generalizations of guidance, activities that are appropriate for the curriculum for the young child with emphasis on intellectual development. Must accompany FCD 470. Prerequisites: FCD 270 and 390. Arrangements should be made for registration several quarters in advance. (6F, W, Sp, Su) **Lambert, Staff**

485. (178) Practicum in Agencies Serving Children. Emphasis on experience in the Primary Children's Hospital. Prerequisites: FCD 470, 475. (12F, W, Sp, Su) **Lambert**

490. (190) Independent Study. Credit arranged. (F, W, Sp, Su) **Staff**

Graduate

600. (252) Seminar in Child Development. (3Sp) **Lewis**

610. (251) Seminar in Family Relations. (3F) **Skidmore**

620. (267) Deprivation in Early Childhood. Effects of deprivation on the preschool child; application of nursery school methods and curriculum to children with restricted and limited backgrounds; the child and his family. (3W) **Carter**

630. (280) Marriage Counseling. Theory and practice in premarital, marriage, and family counseling. (3W) **Skidmore**

635. (281) Marriage Counseling Practicum. Supervised practice in marriage counseling in the university, community agencies, and private setting (arr. Sp) **Skidmore**

640. (254) Current Research in Family and Child Development. Review and appraisal of research. (3Sp) **Schvaneveldt**

660. (275) Internship in Preschool Education. Experimental methods of working with children and development of insight into children's behavior. Involves limited supervision with personal responsibility for program planning in working with student teachers. Prerequisite: FCD 470, 475. (6F, Sp, Su) **Lambert**

**Taught 1972-73

670. (287) Family Theory and Frameworks. Comparative assumptions; the history and development of various framework. (3Su) **Schvaneveldt**

680. (293) Research Methods. See Family Life 680. (3F) **Schvaneveldt**

690. (290) Independent Study. Credit arranged. (F, W, Sp, Su) **Staff**

697. (295) Research for Master's Degree and Thesis. Credit arranged. (F, W, Sp, Su) **Staff**

699. (400) Continuing Registration. Credit arranged. (F, W, Sp, Su) **Staff**

**Taught 1972-73

**Department of*

Food and Nutrition

Head: Professor Ethelwyn B. Wilcox

Office in Family Life 111

Professors Margaret B. Merkeley, Phyllis R. Snow

Associate Professors Flora Bardwell, Amy R. Kearsley, Joseph P. Kesler, Arthur W. Mahoney

Assistant Professor Deloy G. Hendricks

Instructors Charlotte Brennand, Frances Taylor, Bonita Wyse

Degrees: Bachelor of Science (BS), Master of Science (MS), Doctor of Philosophy (PhD)

Major: Food and Nutrition

The demand for nutrition and food science information has increased, as has the need for dietitians, nutritionists, and food specialists. Several factors in these changing times account for this increased need: the world population explosion, the increasing proportion of older-age persons in the population, the emphasis on providing all segments of our population with optimum nutrition, the production of special foods, for the old, young, obese, or diabetic, and the need to understand the relations among nutrition, metabolic disorders, and mental and physical health.

The Nutrition curriculum at the BS level prepares students for dietetic internships in specializations recognized by the American Dietetic Association: general (therapeutic and administrative), administration or management, clinical and therapeutic, community nutrition, nutritional sciences.

The general dietitian works in hospitals, schools, and certain industrial plants where she supervises the feeding of large groups of people. She may be employed by food industries for product development and promotion. As a therapeutic dietitian she designs special diets to meet the physical, cultural, and psychologi-

*In College of Family Life.

and time, energy, and money resources of the family. Prerequisite: FN 123 or pass the waiver test. (3F, W, Sp) **Brennand**

310. (106) Sensory Evaluation of Foods. Physiological methods and practice in the sensory evaluation of foods. Threshold values, statistical analysis and taste panel experience is emphasized. Prerequisite: Applied Statistics 351 or instructor's consent. (3Sp) **Brennand**

397. (197) Honors Studies. See Family Life 397. Credit arranged. (F, W, Sp, Su) **Staff**

407. (107) Science in Food Preparation. Scientific principles underlying modern food theory and practice. Relation of physical and chemical properties of food components and their systems to food preparation. Prerequisites: Organic Chemistry, FN 123. (3F, W) **Brennand**

408. (108) Science in Food Preparation. Continuation of FN 107. (3W, Sp) **Brennand**

***409. (109) Experimental Foods.** Objective tests and problem solving in food research. Prerequisite: FN 408, or instructor's consent. (3Sp) **Brennand**

440. (140) Nutrition. Discussion of nutrient metabolism and nutritional needs during the life cycle of man. Laboratory problems include energy balance, animal feeding experiments and certain chemical analyses. Three lectures, one lab. Prerequisites: Organic Chemistry, Physiology 130. (4F, Sp) **Wyse**

443. (143) Nutrition Lab. Laboratory problems include energy and dietary requirements of humans, small animal studies, and some laboratory methods of nutritional analysis. Prerequisite: Organic Chemistry. (1F, Sp) **Mahoney**

445. (145) Diet Therapy. Dietary modifications necessary in pathological conditions; role of dietition as a member of health care team. Prerequisite: FN 440, Biochemistry. (4Sp) **Wyse**

446. (146) Food Preservation. Effect of methods of manufacture, preservation and storage of food products and the influences of microorganisms on the quality of foods. Prerequisite: FN 408 or instructor's consent. (2W) **Brennand**

447. (147) Food Economics. Availability and utilization of food as affected by national economic systems, methods of distribution and other relevant economic and cultural factors. Prerequisite: One course in Economics or consent of instructor. (2W) **Brennand**

450. (150) Seminar. Reports and discussion on current literature. (1Sp) **Staff**

480. (183) Layout, Design and Equipment. Planning of institutional kitchens; selection, arrangement, and maintenance of equipment. (3F) **Wyse**

481. (180) Quantity Food Preparation. Principles of food preparation applied to large quantity production, menu planning, food selection and storage. Three lectures, two labs. Prerequisite: FN 408. (5W) **Taylor**

482. (182) Institutional Organization and Management. Principles of organization, management theory, financial controls, human and labor relations, employee training and sanitation. (4Sp) **Wyse**

***488. (148) Maternal and Child Nutrition.** Nutritional requirements of the mother and the pre-school child. Problems of national and world malnutrition and possible methods of alleviating these conditions. Prerequisite: FN 440 or consent of instructor. (2W) **Staff**

490. (190) Independent Study. Credit arranged. (F, W, Sp, Su) **Staff**

Graduate

600. (200) Nutrition Lab. Principles of basic techniques used in nutrition research; use and application of instrumentation in nutrition research. Prerequisite: Biochemistry. (3W) **Hendricks**

601. (201) Nutrition Lab. Application of basic research techniques to current nutrition problems, i.e. nutrient balance studies, serum and urine components. Prerequisite: FN 600 or instructor's consent. (3Sp) **Mahoney**

607. (207) Laboratory Methods in Food Research. Organoleptic, physical and chemical methods in food research. Prerequisites: FN 409, Organic Chemistry. Taught as needed. (2) **Brennand**

630. (230) Human Nutrition. An overview of world food production and consumption trends, as they relate to nutritional status of individuals. Metabolism of vitamins and minerals as applied to nutritional requirements and food supplies of people. Prerequisites: FN 440, Biochemistry. (4W) **Hendricks**

631. (231) Human Nutrition. Metabolism of carbohydrates, proteins, and lipids as related to nutritional requirements and food supplies of people. Critical analysis of methods used in assessing human nutritional status. Prerequisites: FN 440, Biochemistry. (4Sp) **Mahoney**

633. (233) Readings in Foods. A critical review of scientific literature in the field of foods. Prerequisite: FN 409. Taught as needed. (3) **Brennand**

675. (275) Food Service Administration. Directed study on selected problems in quantity foods or institutional management for graduate students. Taught as needed. Credit arranged. (F, W, Sp, Su) **Staff**

690. (new) Independent Study. Credit arranged. (F, W, Sp, Su) **Staff**

697. (295) Thesis Research. Credit arranged. (F, W, Sp, Su) **Staff**

698. (new) Research Consultation. Credit arranged. (F, W, Sp, Su) **Staff**

699. (400) Continuing Registration. Credit arranged. (F, W, Sp, Su) **Staff**

743. (243) Nutrition and Growth. Relation of nutrition to growth from the prenatal period to old age. Prerequisite: FN 440. Taught as needed. (3) **Mahoney**

780. (291) Seminar. Reports and discussions on current literature. (1F, W, Sp) **Staff**

790. (290) Independent Study. Credit arranged. (F, W, Sp, Su) **Staff**

797. (new) Dissertation Research. Credit arranged. (F, W, Sp, Su) **Staff**

799. (new) Continuing Registration. Credit arranged. (F, W, Sp, Su) **Staff**

*Taught 1971-72.
**Taught 1972-73.

**Department of*

Food Science and Industries

Head: Professor C. A. Ernstrom

Office in Animal Science 212

Professors C. I. Draper, D. R. Morgan, G. H. Richardson, D. K. Salunkhe, Ethelwyn B. Wilcox

Associate Professors J. C. Batty, P. B. Larsen

Assistant Professor T. A. Gillett

Visiting Assistant Professor B. Singh

Instructor Charlotte Brennand

Degrees: Bachelor of Science (BS), Master of Science (MS)

Majors: Food Science and Industries, also a double major in Food Science and Industries and Business Administration

Food processing, packaging, and distribution constitute one of America's largest industries. There is a critical shortage of technically trained personnel in the food industry, and excellent opportunities exist for graduates who are prepared for either domestic or foreign service.

The Department of Food Science and Industries offers programs leading to Bachelor of Science and Master of Science degrees. A Doctor of Philosophy degree in Food Science and Technology may be obtained through an interdepartmental program.

Excellent relations exist between the department and food processing companies who provide summer employment for departmental majors. This allows an opportunity for students to gain practical experience in food pro-

*In College of Agriculture.

cessing operations prior to graduation.

Majors in the Department of Food Science and Industries may obtain their BS degree under a science-oriented or a general curriculum option, or they may pursue a program leading to a double major in Food Science and Industries and Business Administration. Within each curriculum option there is also opportunity for specialization in dairy, meats, or fruit and vegetable processing.

Science Option. Students who choose the science option receive excellent background training in Chemistry and Bacteriology. Graduates are particularly qualified to enter graduate school to earn advanced degrees in Food Science. They are also in demand by industry for positions in research, product development, and production, and are sought by federal and state control laboratories.

General Option. The general option provides an opportunity for Food Science students to obtain a broad background in several areas of interest in addition to their training in the processing and preservation of foods. Graduates from the general option are well qualified to assume responsibilities in production and quality control in the food industry, or in federal, state, and local food regulatory agencies.

Double Major in Food Science and Industries and Business Administration. The double major program essentially gives a student a major in Food Science and Industries as well as in Business Administration, and prepares him particularly to enter the management training programs of large food processing companies. Graduates from the joint major program also find excellent employment in sales and marketing in the food industry, as well as with allied businesses such as food industry supply firms. They are also in demand by federal, state, and local regulatory agencies.

Science Option

FRESHMAN YEAR

Courses	Credits
English 101, 102, 103	9
Math 105, 220	10
Economics 200	5
Biology 121	5
Bacteriology 111, 112	5
Food and Nutrition 122	3
PE, MS, AS	3
Electives (Math 106)[2]	5-10
	45-50

SOPHOMORE YEAR

Chemistry 121, 122, 123	15
Math 221	5
Applied Statistics 351	5
[1]Food Processing	5
Social Sciences and Humanities	17
Food Science and Industries 105	2
	49

JUNIOR YEAR

Bacteriology 515, 516	3
Bacteriology 510, 511	4
Food Science and Industries 350	5
Food Science and Industries 340, 341	6
Physics 111, 112	10
Chemistry 331, 332	8
Food Science and Industries 310	4
Electives	5
	45

SENIOR YEAR

Food Science and Industries 355	5
[1]Food Processing	14
Chemistry 360, 370	9
Food Science and Industries 510	2
Electives	20
	50

General Option

[1]Food Processing courses may be selected from the following:

FSI 401 (Ice Cream and Ices), FSI 403 (Cheese), FSI 405 (Management and operation of Dairy Plants, FSI 406 (Meat Processing) FSI 407 Processing and Storage of Fruits and Vegetables), Animal Science 470 (Meats), FSI 160 (Market Milk).

[2]Students who have not had trigonometry in high school should take Math 106.

FRESHMAN YEAR

Courses	Credits
English 101, 102, 103	9
Math 105	5
Economics 200	5
Biology 121	5
Bacteriology 111, 112	5
Food and Nutrition 122	3
PE, MS, AS	3
Social Sciences and Humanities	8
Food Science and Industries 105	2
[3]Electives	3
	48

SOPHOMORE YEAR

Chemistry 111, 112, 141	15
Applied Statistics 351	5
[1]Food Processing	5
Social Sciences and Humanities	9
Physics 111, 112	10
One Soils Class	3
	47

JUNIOR YEAR

Bacteriology 515, 516	3
Bacteriology 510, 511	4
Food Science and Industries 350	5
Food Science and Industries 340, 341	6
Food Science and Industries 310	4
[1]Food Processing	5
[2]Option Requirements	20
Electives	0-2
	47-49

SENIOR YEAR

Food Science and Industries 355	5
[1]Food Processing	13-15
Food Science and Industries 510	2
[2]Option Requirements	17
One Plant Science course, one Animal Science course	6
Electives	2-5
	45-50

Double Major in Food Science and Industries and Business Administration:

FRESHMAN YEAR

Courses	Credits
English 101, 102, 103	9
Math 105	5
Biology 121	5
Economics 200, 201	10
Food Science and Industries 105	2
Bacteriology 111, 112	5
Business Administration 201	2
PE, MS, or AS	3
[3]Electives (Math 136)	4-7
	45-48

SOPHOMORE YEAR

Chemistry 111, 112, 141	15
Physics 111, 112	10
Math 242	5
Social Sciences and Humanities	7
Food and Nutrition 122	3
[1]Food Processing	5
[3]Electives	3-5
	48-50

JUNIOR YEAR

Food Science and Industries 350	5
Bacteriology 515, 516	3
Bacteriology 510, 511	4
Food Science and Industries 340, 341	6
Accounting 305	4
Business Administration 506, 507	6
Business Administration 570	5
Business Administration 511	4
Food Science and Industries 310	4
[1]Food Processing	3-5
[2]Electives	2-5
	45-49

SENIOR YEAR

Social Sciences and Humanities	5
Food Science and Industries 355	5
[1]Food Processing	10
Business Administration 515, 540, 550, 560	20
Food Science and Industries 510	1
[3]Electives	7-9
	48-50

Food Science and Industries Courses

Undergraduate

105. (50) Food Standards and Regulations. History, importance, and make-up of food standards and regulations as established by city, state, federal, and international agencies. Recent trends are emphasized. (2Sp)
Richardson

160. (60) Market Milk. Modern sanitary methods of producing, processing, and marketing milk, cream, and related products. (5W)
Larsen

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[1]Food processing courses may be selected from the following: FSI 160 (Market Milk), FSI 401 (Ice Cream and Ices), FSI 403 (Cheese), FSI 405 Management and Operation of Dairy, FSI 406 (Meat Processing), FSI 407 (Fruits and Vegetables), Animal Science 470 (Meats).

[2]Option requirements may be selected from courses related to Food Science and approved by the department. Eighteen credits from this group must be in a single department to qualify the student for a minor.

[3]Students who have not had trigonometry in high school should take Math 106.

310. (106) Sensory Evaluation of Foods. Physiological methods and practice in the sensory evaluation of foods. Threshold values, statistical analysis, and taste panel experience. (4Sp) **Brennand, Larsen**

340. (136) Food Engineering I. Basic engineering concepts and their application to the food industry. Introductory topics in thermodynamics. Definitions, nomenclature, conservation of mass, first and second laws of thermodynamics, psychrometrics, simple power and refrigeration cycles. Prerequisites: Math 220, Physics 212. Three lectures. (3W) **Batty**

341. (137) Food Engineering II. Continuation of basic engineering concepts and their application to the food industry. Introductory concepts in fluid mechanics and heat transfer. Engineering measurement techniques are presented in the laboratory. Prerequisite: Food Science and Industries 340. Two lectures, one lab. (3Sp) **Batty**

350. (100) Food Analysis. Application of quantitative and qualitative techniques to the determination of composition and quality of food products. Prerequisites: Chemistry 141 or 116. (5W) **Richardson**

355. (130) Food Chemistry. Composition, structure, and properties of food constituents, and the chemistry of changes that occur during the processing of food for utilization by man. Prerequisites: Chemistry 141 or 332. (5Sp) **Ernstrom**

401. (101) Ice Cream and Ices. Purchase of raw materials. Chemical and physical structure of an ice cream mix and its relation to the finished product. Standardizing, processing, freezing, and merchandising commercial ice cream, sherbets, and ices. Refrigeration mechanics of commercial ice cream plants. (5Sp) **Morgan**

403. (103) Cheese. Methods of curd formation and conversion of curd into cheese. Mechanics of cheese making. Chemistry and microbiology of cheese curing. Classification, statistics, marketing, and factory organization. (5F) **Ernstrom**

405. (105) Management and Operation of Dairy Plants. Personnel problems, advertising, selling, managerial use of records, and other principles underlying successful management and operation. All operations of the creamery are conducted by this class. (5W) **Larsen**

406. (150) Meat Processing. Production of various sausage and luncheon meats will be emphasized as well as curing, cooking, smoking, rendering, packaging, and spoilage of meat products. (4F) **Draper, Gillett**

407. (140) Processing and Storage of Fruits and Vegetables. Post-harvest physiology and storage diseases of fruits and vegetables. Commercial preservation of fruits and vegetables by canning, freezing, drying, pickling, and radiation. Manufacture of juice concentrates and syrups; packaging, quality control, and marketing. Prerequisites: Bacteriology 111, 112, Chemistry 141 or 116, or by special permission. Four lectures, one lab. (5F) **Salunkhe**

510. (180) Seminar. Discussion and reports on current Food Science topics. (1F, W, Sp) **Staff**

590. (new) Special Problems. Credit arranged. (F, W, Sp, Su) **Staff**

Graduate

601. (241) Food Toxicology. Modern food technology as related to production of toxins. Ecological aspects in production of toxins in fresh and processed foods. Naturally occurring toxins in foods; alkaloids, glycosides, components of spices and condiments. Poisonous fruits, vegetables, mushrooms, and seeds. Beneficial and toxic effects of physical and chemical treatments of foods. Ionizing radiations, antibiotics, antifungals, and other pesticides. Gaseous environments — CO, CO_2, N_2. Toxicity of excess vitamins, amino acids, and minerals. Synthesis and degradation of antivitamins in foods. Accumulation of toxins in food fats. Toxicity of air and water pollutants in foods. Occurrence, detection, mode of action and brief discussion on carcinogenic effects of important toxins in foods. (3F) **Salunkhe**

610. (220) Seminar. Discussion and reports on current Food Science topics. (1F, W, Sp) **Staff**

690. (210) Special Problems. Credit arranged. (F, W, Sp, Su) **Staff**

697. (200) Research and Thesis. Credit arranged. (F, W, Sp, Su) **Staff**

699. (400) Continuing Graduate Advisement. Credit arranged. (F, W, Sp, Su) **Staff**

797. (new) Research and Thesis. Credit arranged. (F, W, Sp, Su) **Staff**

799. (new) Continuing Graduate Advisement. Credit arranged (F, W, Sp, Su) **Staff**

*Department of

Forest Science

Head: Associate Professor Lawrence S. Davis

Office in Forestry-Zoology 155

Professor Emeritus J. Whitney Floyd

Professors T. W. Daniel, Raymond R. Moore

Associate Professors George E. Hart, John D. Hunt, John D. Schultz

Assistant Professors Perry J. Brown, Carl M. Johnson, Ronald M. Lanner, Larry E. Royer

Lecturer A. Allen Dyer

Assistant Research Professors Norbert V. DeByle, Richard G. Krebill

Collaborators Philip A. Barker, Robert D. Doty, Robert S. Johnston, Bland Z. Richardson, George A. Schier

Degrees: Bachelor of Science (BS), Master of Science (MS), Master of Forestry (MF), Doctor of Philosophy (PhD)

Majors: Forest Management, Forest Recreation, Forest-Watershed Management, Outdoor Recreation, Watershed Science

The first three programs of study are options of the basic forestry curriculum. Comprehensive training in forestry subjects is given to all students qualifying them as professional foresters by civil service and Society of American Foresters standards. It is desirable that the student know by the end of his Sophomore year in which of these three majors to enroll.

A fourth program, Outdoor Recreation, is described following the three regular Forest Science curricula. The interdepartmental program in Watershed Science is described last.

An upper division student who has an accumulative grade point average of 3.2 or better may, with the approval of his major professor, substitute certain optional courses for generally required courses.

*In College of Natural Resources.

Undergraduate Study

Lower Division

All students must meet the general University graduation requirements listed elsewhere in this catalog.

Common Freshman and Sophomore core curricula for Forest Management, Forest Recreation and Forest-Watershed Majors:

FRESHMAN YEAR

Courses	Credits F	W	Sp
English 101, 102, 103	3	3	3
Biology 120, 121, 122	5	5	5
[1]Chemistry 111, 112	5	5	
Forest Science 101	1		
Range Science 101		1	
Wildlife Resources 100			1
[2]Economics 200			5

[1]Students who present evidence of having obtained above-average grades for a year of high school chemistry are not required to take Chemistry 111 and 112.

[2]This course satisfies part of the University general education requirements in the Social and Behavioral Sciences and Humanities.

PE, MS or AS	1	1	1
Totals	15	15	15

SOPHOMORE YEAR

	F	W	Sp
Geology 111	5		
Forest Science 320, 321	3	2	
[2]Philosophy 210		5	
[1, 3]Social/Behavioral Science		5	
Botany 440		5	
[2]Math 242			5
Soils 358			5
[3]Speech 105			3
[4]Electives	8		3
Totals	16	17	16

Summer Camp

Forest Science 301	3
Forest Science 302	4
Range Science 298	1
Wildlife Resources 200	1
Total	9

Forest Management Option

The option in Forest Management provides basic training in forestry for the student who plans to go into administrative work on forest lands or into forestry research.

Upper Division

JUNIOR YEAR

Courses	Credits F	W	Sp
Applied Statistics 351	5		
Forest Science 384, 385	6		
Forest Science 440	3		
Forest Science 360		4	
Forest Science 330, 331		4	3
Forest Science 322, 323		3	3
Forest Science 441			5
Range Science 340		3	
[4]Electives	3	3	5
Totals	17	17	16

SENIOR YEAR

	F	W	Sp
Forest Science 442, 443, 444	4	4	5
Forest Science 445	3		
[5]Forest Science 465		3	
Forest Science 424		3	
[4]Electives	10	7	12
Totals	17	17	17

Forest Recreation Option

The second option, Forest Recreation, is designed to provide suitable training in outdoor recreation organization, management, and supervision. In addition, a student is given sufficient forestry training to qualify for the federal civil service forestry examinations.

The U.S. Forest Service established a Cooperative Forest Recreation Research Unit in the College of Natural Resources in 1962. This provides additional strength to the teaching and research program in Forest Recreation.

Upper Division

JUNIOR YEAR

Courses	Credits F	W	Sp
Applied Statistics 351	5		
Forest Science 384, 385	6		
Forest Science 350	3		
Forest Science 440		3	
Forest Science 330, 331		4	3
Forest Science 322, 323		3	3
Forest Science 441			5
Political Science 511			5
[4]Electives	3	7	
Totals	17	17	16

SENIOR YEAR

	F	W	Sp
Forest Science 443	4		
[6]Forest Science 445	3		
[5]Forest Science 465		3	
Forest Science 450		2	
Forest Science 451, 452		3	3
Forest Science 444			5
Range Science 340		3	
[4]Electives	10	6	9
Totals	17	17	17

Forest-Watershed Management Option

The third option, Forest-Watershed Management, provides a

[1]Students may elect one of the following courses: Psychology 101, Sociology 101, Anthropology 101 or Biology 308.

[2]Students who are not adequately prepared to take Math 242 may need to take Math 134 and/or Math 105. In addition, if they have not had a course in trigonometry, they will need to take Math 106.

[3]This course satisfies part of the University general education requirements in the Social and Behavioral Sciences and Humanities.

[4]Elective credits are used to complete the University general education requirements, and to serve as free electives.

[5]Forest Science 466 may be substituted for Forest Science 465.

[6]Forest Science 360 may be substituted for Forest Science 445.

basic background in forestry. In addition, selected courses in Watershed Science are taken. It serves as a base for the student who may undertake graduate work in forest hydrology, and it provides an improved understanding of watershed problems for the student who may enter directly into a career in forest administration.

JUNIOR YEAR

Courses	Credits F	W	Sp
Applied Statistics 351	5		
Forest Science 384, 385	6		
Forest Science 440	3		
Forest Science 330, 331		4	3
Forest Science 322, 323		3	3
Watershed Science 380, 480		3	3
Forest Science 441			5
[1]Electives	3	7	3
Totals	17	17	17

SENIOR YEAR

	F	W	Sp
Forest Science 443	4		
Forest Science 445	3		
Geology 560	5		
Watershed Science 481, 489	4	1	
[2]Forest Science 465		3	
Civil Engineering 443		4	
Forest Science 444			5
[1]Electives		9	12
Totals	16	17	17

Outdoor Recreation

The Outdoor Recreation major complements the department's offering in Forest Recreation. The Outdoor Recreation curriculum primarily trains graduates to hold jobs with governmental agencies involved with outdoor recreation at the national, state, and local levels, with private firms, and with non-profit organizations. In contrast to the Forest Recreation curriculum, a major in Outdoor Recreation does not qualify the graduate as a forester. The Outdoor Recreation curriculum places greater emphasis on the behavioral sciences and communications than do other curricula in the Forest Science Department.

In addition to the course requirements listed below, all Outdoor Recreation majors will be required to complete an approved minor (18 credits). Forestry will not be approved as a minor.

Lower Division

Courses	Credits
English 101, 102, 103	9
Math 242	5
Political Science 110	5
Sociology 101 or 160 or Anthropology	5
Economics 200	5
Geology 111	5
Biology 120, 121, 122	15
PE, MS or AS	3
Total	57

Upper Division

Forest Science 440	3
Forest Science 320, 321	5
Forest Science 441	5
Forest Science 546	3
Forest Science 350	3
Forest Science 450	2
Forest Science 451	3
Forest Science 452	3
Forest Science 453	3
Journalism 430	3
Forest Science 384, 385	6
Applied Statistics 351	5
English 303	6
LAEP 530	3
Speech 105	3
Economics 300, 301	6
Behavioral Sciences	8
Total	69

Graduate Study

The department offers the Master of Science and Doctor of Philosophy degrees as professional degrees. The Master of Forestry degree is offered for those students who lack prior academic training in forestry. The master's degree is granted in the following four subject areas: Forest Management - Economics, Forest Biol-

[1]Elective credits may be used to satisfy University general education requirements or as free electives.

[2]Forest Science 466 may be substituted for Forest Science 465.

ogy, Outdoor Recreation, and Watershed Science.

Forest Science Courses

Undergraduate

101. (1) Survey and Orientation. Survey of the profession of forestry and the relation of conservation and multiple uses of wildland resources to the welfare of the state and nation. (1F) **Hart**

301. (96) Forest Surveying. Practical field problems in surveying methods commonly employed in forest, range, and wildlife management. Lab fee $5. (Summer Camp 3 credits) **Moore**

302. (97) Forest Practice. Field studies in inventories, successional stages, and growth of stands of trees. Studies of related uses of wildlands. Lab fee $5. (Summer Camp 4 credits) **Daniel, Moore**

320. (112) Dendrology I. Hardwoods. Identification, distribution, and silvics of the more important hardwood forest trees of the United States. (3F) **Lanner**

321. (113) Dendrology II. Conifers. Identification, distribution, and silvics of the more important coniferous forest trees of the United States. (2W) **Lanner**

322. (114) Silviculture I. Characteristics of tree species that influence silvicultural practice in the United States. Prerequisites: Summer Camp. For Sci 320, Botany 123, For Sci 302. (3W) **Daniel**

323. (115) Silviculture II. Silvicultural systems used in securing natural reproduction of forests and their applications to the important species and forest types in the United States. Prerequisite: For Sci 322. (3Sp) **Daniel**

330. (106) Forest Measurements I. Measurements of timber in log, tree, and stand; log rules and scaling; statistical methods useful in analyzing forest data; timber cruising practices; aerial photo interpretation, and photogrammetry in forest practice. Prerequisite: Summer Camp. (4W) **Moore**

331. (107) Forest Measurements II. Volume and yield table compilation; growth of even-aged, all-aged, and residual cutover stands. Prerequisite: For Sci 330. (3Sp) **Moore**

350. (137) Recreational Use of Wildland. Factors responsible for recreational use, legislative programs, philosophical concepts, and descriptions of recreation agencies involved in wildland recreation management. (3F, Sp) **Brown, Hunt**

360. (126) Wood Science and Products. Manufacturing of major wood products and study of wood structure and physical characteristics relevant to the manufacturing processes of products. (3W) **Staff**

376. (142) Forest and Tundra Ecosystems. Composition distribution, successional patterns, and management of forested ranges. Prerequisite: Plant Taxonomy. Three lectures. (3W) **Box, West**

384. (184) General Ecology. Role of heredity and environment in plant and animal behavior; plant succession, competition and indicators; analysis of habitat factors influencing plant growth and distribution. (5F, Sp, Su) **Staff**

385. (185) General Ecology Laboratory. (1F, Sp, Su) **Staff**

410. (110) Principles of Conservation. Conservation problems designed to acquaint one with the nature and extent of the renewable resources of the United States and the methods of conservatively using them. (3F, W, Sp, Su) **Johnson, Floyd**

411. (111) Principles of Conservation Workshop. An introductory course taught on a continuous basis five or more days. Concerned with the problems of renewable natural resource conservation as they relate to a quality environment for people. (Credit variable, scheduled as required) **Johnson**

412. (103) Silviculture and Dendrology. Basic silvics: silviculture systems, western conifers and western regional silviculture, elements of eastern hardwoods and types. Not open to Forest Science majors. Prerequisites: For Sci 384, Summer Camp. (5W) **Johnson**

424. (120) Silviculture III. Regional silviculture of the United States. Prerequisite: For Sci 323. (3W) **Daniel**

425. (116) Seeding and Planting. Seed collection, extraction and cleaning methods; germination testing; storage of forest tree seeds; practical experience in field planting and nursery work. Prerequisite: For Sci 323. (2Sp) **Daniel**

440. (132) Forest Administration and Policy. A study of forest administration, organization, policy formation and personnel management. Development of forest and conservation policy and its effects on current forestry practices. (3F, W, Sp) **Brown, Floyd**

441. (123) Forest Economics. Economic problems involved in the utilization of forest land and timber, distribution of forest products, and the management for multiple uses. (5Sp) **Davis**

442. (122) Forest Valuation. Determination of monetary values in forest growing stock

and land analysis of alternate management methods by use of standard valuation techniques. Prerequisite: For Sci 441. (4W) **Moore**

443. (121) Forest Management. Physical factors influencing the regulation of a forest for sustained yield: site, growing stock and rotation; compilation of data for management plans. Prerequisite: For Sci 323 (4F) **Davis**

444. (124) Forest Management II. Analytical methods for developing satisfactory and optimum forest management alternatives. Case analysis of comprehensive resource management problems. Criteria for judging performance of forest management practices. (5Sp) **Davis, Moore**

445. (125) Logging. Principles and methods of harvesting wood products, with emphasis on cost, values, and the application of forestry to the harvesting process. Prerequisite: For Sci 302. (3F) **Moore**

450. (138) Regional Recreation Planning. Land classification and economics of various forms of forest recreational use. (2W) **Royer**

451. (139) Interpretive Planning. Analysis and development of interpretive programs for recreational areas. Techniques of natural history interpretation. Evaluation and planning of visitor information programs. (3W) **Hunt**

452. (140) Forest Recreation Management. Consideration of land management objectives, alternative of development regulations, and user satisfaction. (3Sp) **Floyd**

453. (135) Recreation Facility Management. A study of factors influencing the management of outdoor recreation sites. Consideration is given to management of individual sites with emphasis on structural and ecological management. (3W) **Hunt**

465. (118) Forest Protection I. Prevention, presuppression and suppression of forest and range fires, including economic and physical effects; fire behavior. (3W) **Hart**

466. (119) Forest Protection II. Problems of administration and economics in protecting forests from biological enemies. Prerequisite: For Sci 323. (3F) **Lanner**

480. (147) Forest Science Seminar. Credit arranged. **Staff**

491. (new) Directed Study. Credit arranged. **Staff**

492H. (150) Honors Problems. Credit arranged. **Staff**

546. (133) Population and Resource Perspectives. Relationship between man and his environment. Limits the natural environment places on man's activities and economic growth. (3W) **Brown**

Graduate

625. (205) Advanced Silviculture. Intensive study of a particular region by individual students. Group work consists of advanced treatment of silvics and silviculture, with emphasis on physiological aspects of both subjects. (3F, W, Sp) **Daniel**

628. (215) Tree Improvement and Forest Genetics. Forest tree improvements through selective breeding and testing. Course includes study of the techniques and problems of applying the principles of genetics to forest trees. (3Sp) **Lanner**

641. (206) Forest Management. Advanced study within the fields of forest measurements, valuation, regulation, organization, and development of forest properties. (3W) **Davis, Moore**

642. (209) Forest Economics. Particular attention is given to the application of economic theory to solving present-day problems in the multiple use of forest lands and in the production and distribution of forest products. (3Sp) **Davis**

643. (232) Natural Resources Policy and Administration. Theories of resource use. Ability of natural resource organizations to deal with contemporary resource problems. (3Sp) **Staff**

651. (203) Forest Recreation I. Analysis of recreation participation and programs. Functions served by participation, the constraints on participation, projection of participation levels, and the allocation of outdoor recreation resources. (1Sp) **Brown, Davis**

652. (210) Forest Recreation II. A synthesis of the institutional, spatial, and physiographical factors involved in providing outdoor recreation opportunities. **Hunt, Royer**

670. (204) Forest Ecology. Study of past and present distribution of forest species and forest communities and the physical-biological basis of distribution and growth performance. (3W) **Schultz**

671. (222) Forest Ecosystem Analysis. Interpretation of the dynamics of forest ecosystems through simulation modeling and other techniques. Time arranged. (8) **Schultz**

680. (new) Forest Science Seminar. Credit arranged. **Staff**

691. (new) Directed Study. Credit arranged. **Staff**

697. (new) Thesis research. Credit arranged. **Staff**

698. (new) Research Consultation. Credit arranged. **Staff**

699. (new) Continuing Registration. Credit arranged. **Staff**

780. (new) Forest Science Seminar. Credit arranged. **Staff**

797. (new) Dissertation Research. Credit arranged. **Staff**

798. (new) Research Consultation. Credit arranged. **Staff**

799. (new) Continuing Registration. Credit arranged. **Staff**

**Department of*

Geology

Head: Professor Clyde T. Hardy

Office in Main 258

Professor Emeritus J. Stewart Williams

Professor Donald R. Olsen

Associate Professor Robert Q. Oaks, Jr.

Assistant Professor Raymond L. Kerns, Jr.

Degrees: Bachelor of Arts (BA), Bachelor of Science (BS), Master of Science (MS)

Major: Geology

The geologic setting of USU offers opportunities for geologic studies scarcely equaled elsewhere in the country. A variety of geologic structures, rock types, erosional and depositional features of running water and glaciers, fossil types, ground water, mass wasting—in short, a magnificent display of features of geologic interest may be seen within a few miles of the campus. The campus is within driving distance of metamorphic and igneous rock terrains. An easy drive will bring the student to a variety of mineral and rock materials.

USU campus is built in a delta of ancient Lake Bonneville, a site offering a rich field of investigation in lacustrine deposits and Pleistocene geology. The Bear River mountain range, known for the thick and almost complete section of Paleozoic formations, rises to the east of the campus.

The Department of Geology is staffed by a small but competent group of geologists with widely varying backgrounds and interests.

The department offers courses for both non-science and science majors. Introductory courses in Geology satisfy the needs of students in many different fields. Undergraduate courses designed for Geology majors emphasize geologic forces and the principles of stratigraphy and sedimentation, structure, mineralogy, petrology,

*In College of Science.

paleontology, surficial geology, and field geologic methods.

In Geology, as in many other sciences, it is becoming necessary for the student to take a graduate degree. The department offers the MS degree and there is no foreign language requirement for this degree.

Geology Club. The Geology Club, under general supervision of the department, is an organization for all Geology majors.

Undergraduate Study

Bachelor of Arts Degree. For a BA in Geology, a foreign language is accepted in place of certain Geology courses. Programs are adjusted to fit individual student needs.

Bachelor of Science Degree. For a BS in Geology the following courses are required: Chemistry 121, 122; English 303; Geology 111, 400, 410, 416, 420, 430, 470, 500, 522; Math 105, 106, 220; and Physics 111, 112, 113. Recommended are Applied Statistics 351; Chemistry 123; Civil Engineering 224; Computer Science 150; Industrial and Technical Education 120; and Math 221, 222, 223.

Minors. A student majoring in Geology may select a minor. Suggested minors are Applied Statistics, Chemistry, Computer Science, and Mathematics. Other students may select Geology as a minor.

Teaching Majors and Minors. Geology majors may complete certification requirements for teaching. Both a teaching major and minor are available in addition to the earth science composite major and the general science composite major. Other students may select Geology as a teaching major or minor.

Graduate Study

Master of Science Degree. The Department of Geology offers advanced study and research leading to the Master of Science degree.

Geology Courses

Undergraduate

101. (1) Introductory Geology. For students in non-science areas. (5F, W, Sp) **Staff**

111. (3) Physical Geology. For majors in Geology, Forest Science, Range Science, Soil Science, and other sciences. (5F, W, Sp) **Oaks**

122. (4) Historical Geology. Physical history of the earth and the development of life as indicated by the geological record. (5F, W, Sp) **Staff**

130. (31) Physical Science. (3F, W, Sp) **Staff**

400. (101) Mineralogy. Identification of minerals by physical and chemical tests. Elementary crystallography. Prerequisites: Geol 110, Chemistry 121, 122. (5F) **Olsen**

410. (109) Sedimentary Petrology. Classification and origin of igneous and metamorphic rocks with emphasis on mineral composition. Prerequisite: Geol 400. (3Sp) **Kerns**

416. (107) Igneous and Metamorphic Petrology. Classification and origin of igneous and metamorphic rocks with emphasis on mineral composition. Prerequisite: Geol 400. (3W) **Olsen**

420. (110) Structural Geology. Prerequisite: Geol 111. (5F) **Hardy**

430. (106) Invertebrate Paleontology. Introduction to the study of invertebrate fossils. Methods of preparation. Prerequisites: Geol 122, Zoology 137. (5Sp) **Williams**

460. (134) Geomorphology. Quantitative and experimental approach to the study of land forms and associated sedimentary deposits. Emphasis on processes. Prerequisite: Geol 111. (3Sp) **Oaks**

470. (114) Geologic Field Methods. Preparation of geologic and topographic maps utilizing the plane table. Measurement of stratigraphic sections. Prerequisite: Geol 420. (3Sp) **Hardy**

472. (118) Geologic Field Course. (8Su) **Staff**

490. (116) Special Problems. Directed study of selected topics. Written report required. Credit arranged. (F, W, Sp) **Staff**

500. (102) Optical Mineralogy and Petrography. Determination of minerals by using

the petrographic microscope. Classification of igneous rocks. Prerequisites: Geol 400, Physics 113. (3W) **Olsen**

502. (131) X-ray Mineralogy. Principles and methods of mineral identification by X-ray diffraction. Prerequisite: Geol 400. (4W) **Kerns**

522. (108) Stratigraphy. Prerequisite: Geol 110. (5W) **Hardy**

540. (104) General Geochemistry. Principles of geochemistry. Study of the major geochemical systems. Prerequisites: Geol 400, 410, 416, Chemistry 123. (3F) **Kerns**

546. (133) Exploration Geophysics. Principles of exploration geophysics with emphasis on seismic, gravity, and magnetic methods. Prerequisites: Geol 554, Physics 211. (3Sp) **Oaks**

550. (103) Engineering Geology. Application of geology to engineering problems. (3Sp) **Hardy**

552. (113) Economic Geology. Theories of mineral deposition. Genetic classification of mineral deposits. Geologic and geographic occurrence of metallic and non-metallic mineral deposits. Prerequisites: Geol 400, 420. (5Sp) **Olsen**

554. (111) Petroleum Geology. Accumulation and origin of petroleum. Subsurface methods utilized in exploration. Prerequisites: Geol 420, 522. (3W) **Oaks**

556. (117) Ground-Water Geology. Geologic conditions that control the occurrence and purity of ground water, with special reference to western United States. Prerequisite: Geol 111. (4W) **Williams**

558. (135) Marine Geology. Origin of topography and sediments of ocean basins, continental shelves, and shorelines. Prerequisite: Geol 101 or 111. (3Sp) **Oaks**

560. (115) Surficial Geology. Processes active on surface of earth, unconsolidated deposits, and geomorphology. Recent geologic events. For majors in Forest Science, Range Science, Engineering, and Soil Science. Prerequisite: Geol 111. (5F) **Williams**

564. (130) Photogeology. Interpretation of aerial photographs in geologic mapping. Prerequisites: Geol 420, 560. (4Sp) **Oaks**

Graduate

600. (206) Clay Mineralogy. Structure and environmental significance of clay minerals. Prerequisite: Geol 502. (4Sp) **Kerns**

610. (200) Sedimentary Petrography. Classification and description of noncarbonate sedimentary rocks utilizing petrographic microscope. Prerequisite: Geol 500. (3W) **Oaks**

500. (102) Optical Mineralogy and Petrography. (3W) **Oaks**

614. (201) Sedimentary Petrography. Classification and description of carbonate sedimentary rocks utilizing petrographic microscope. Prerequisite: Geol 500. (3Sp) **Oaks**

616. (216) Igneous and Metamorphic Petrography. Classification and description of igneous and metamorphic rocks utilizing petrographic microscope. Prerequisite: Geol 500. (3Sp) **Olsen**

620. (215) Regional Tectonics. (3F) **Hardy**

622. (213) Paleozoic Stratigraphy. (3W) **Williams**

626. (214) Mesozoic and Cenozoic Stratigraphy. (3W) **Hardy**

630. (219) Invertebrate Paleontology. Taxonomic invertebrate paleontology exclusive of microfossils. Prerequisite: Geol 430. (3Sp) **Williams**

636. (212) Paleoecology and Biostratigraphy. (3F) **Oaks**

640. (205) Sedimentary Geochemistry. Detailed study of sedimentary geochemical processes. Prerequisite: Geol 540. (3W) **Kerns**

680. (210) Seminar. Credit arranged. (F, W, Sp) **Staff**

697. (220) Thesis. Credit arranged. (F, W, Sp) **Staff**

698. (400) Continuing Graduate Advisement. Credit arranged. (F, W, Sp) **Staff**

699. (new) Continuing Registration. Credit arranged. (F, W, Sp) **Staff**

*Department of

Health, Physical Education and Recreation

Head: Professor Dale O. Nelson

Office in HPER

Professor Emeritus H. B. Hunsaker

Associate Professors Lois Downs, Lincoln H. McClellan, Arthur H. Mendini, H. Dale Rasmussen

Assistant Professors Nolan K. Burnett, Pauline Fuller, Ralph B. Maughan, Lanny Nalder, Janice Pearce

Instructors Paul R. Boyce, Vonnie Brown, Lucille Chase, Jacqueline W. Fullmer, Fern Gardner

Degrees: Bachelor of Science (BS), Master of Science (MS)

Majors: Physical Education, Health Education, Recreation Education

In the activity courses opportunity is given to develop skills in some physical activity that will help establish a permanent interest in healthful recreation, promote physical fitness, build morale, and maintain health.

All students under the age of 31 must meet the school requirements of three quarters of Physical Education. This requirement should be met by the end of the sixth quarter of residence work. Men may meet this requirement by taking Military Science or Aerospace Studies. It is recommended that requirement 1) and 2) below be completed during the first year.

The requirement must be met by taking: 1) Physical Education 100 (Basic Physical Education), 2) a swimming course — Note: Either or both of these courses may be met by passing waiver tests administered by the Physical Education Department after which students may select courses rather than register for required courses 1) and 2). Selected courses are from five activity groups. Only one course from a group may count toward the requirement. Courses, by groups, are as follows:

Aquatics: All swimming classes.

Dance: All dance classes.

Dual Activities: Boxing (Men), Wrestling (Men), Fencing, Badminton, Tennis, and Self-Defense.

Individual Activities: Skiing, Track (Men), Bowling, Weight Training (Men), Tumbling-Gymnastics (Men), Trampoline (Men), Tumbling Stunts (Women), Adapted Body Conditioning (Women), Archery, Golf, and Cross Country (Men).

Team Activities: Football (Men), Baseball (Men), Softball (Men), Basketball (Men), Soccer (Men), Volleyball (Men), Soccer-Speedball (Women), Volleyball (Women), Basketball (Women), Softball (Women), and Field Hockey (Women).

*In College of Education.

Intramural Activities: The intramural program is planned and conducted by the department to give moral, social, physical, and educational values derived from competitive sports. This program provides for both individual and team endeavors, and the department attempts to make it possible for all students to participate.

The Women's Intramural Association offers a varied program of activities. All women are eligible and encouraged to participate in any of the activities offered.

The department offers an extensive intramural sports program for men. Competition in a variety of activities is conducted in separate leagues: fraternity, department, club, and all-campus. All men are encouraged to participate in one of these leagues.

The **extramural program** of women's sports provides an opportunity for coeds who want to compete in sports above the intramural level.

Extramural sports include: field hockey, volleyball, basketball, softball, tennis, badminton, archery, golf, and skiing. The meets are held at a different campus every year to provide an opportunity to travel and visit other campuses.

Recreation. The department attempts to meet recreational interests of the total studentbody. Through intramural sports, student clubs, recreation periods, and special events, a variety of recreational opportunities are offered. The purpose of these activities is to develop a love for wholesome recreation and sufficient skill to allow individuals to participate with satisfaction and enjoyment in various activities.

Undergraduate Study

A student may major in Physical Education with specialization in Elementary Physical Education, Secondary Physical Education, Professional Scouting or pre-Physical Therapy. Selection of a program of study in these areas should be carefully planned under the guidance of advisers. The following courses, in addition to the three credits required for graduation, are suggested for each of the above areas:

If specializing in Elementary Physical Education, the student should complete PE 227, 112, 200, 202, 400, 203, or 206, 312, 460, 301, 302, 485, 486; six credits in Sports Techniques and six credits from approved electives.

If specializing in Dance, a student should complete PE 221, 227, 240, 241, 242, 400, 311, 312, 313, 480, 481, 310, 460, 463, 314, 467, 315, and 14 credits selected from the following courses: Theatre Arts 150, 152, 301, 554, 371, 372; PE 469, 485, 487.

If planning to enter a Physical Therapy School with a major in Physical Education, a student should work closely with his advisers in selecting courses to fill groups and minor requirements.

Teaching Major. An "application for admission to teacher education" should ordinarily be completed before the Junior year (see College of Education for requirements). Approval is a prerequisite to teacher certification candidacy and to enrollment in Education and Psychology courses.

For Secondary Physical Education majors the following four-year programs are suggested.

PE TEACHING MAJOR MEN

Lower Division

200 Introduction PE
203 Administration of Intramural Sports for Men
[1]220 Fundamentals of Tennis and Archery
[1]221 Fundamentals of Ballroom and Square Dance
[1]222 Fundamentals of Badminton and Golf
[1]223 Fundamentals of Wrestling and Weight Training
[1]224 Fundamentals of Tumbling and Gymnastics — Men
[1]225 Fundamentals of Speedball and Volleyball — Men

Upper Division

400 Social Recreation Leadership
[1]460 Methods in Physical Education
461 Lifesaving
462 Water Safety Instructor's Course
463 Methods of Teaching Ballroom and Square Dance
464 Methods of Teaching Tennis and Badminton
465 Methods of Teaching Volleyball, Speedball and Wrestling
466 Methods of Teaching Tumbling and Gymnastics
470 Football Coaching Methods
471 Basketball Coaching Methods
472 Track and Field Coaching Methods
480 Kinesiology
481 Physiology of Muscular Activity
482 Physical Education for the Exceptional Student
485 Interpretation of Physical Education Objectives
486 Administration of Physical Education
487 Tests and Measurements in Physical Education

PE TEACHING MINOR MEN

Courses		Credits
400	Social Recreation Leadership	3
203	Administration of Intramural Sports for Men	3
480	Kinesiology	3
460	Methods in PE	2
485 or 486		3
470, 471, 472	Methods of Coaching (any one)	2
463, 464, 465, 466 (any two)		4

Four to six credits of electives, 24 to 26 total credits.

PE TEACHING MAJOR WOMEN

Lower Division

200 Introduction to PE
206 Administration of Intramural Sports for Women
[2]220 Fundamentals of Tennis and Archery
[2]221 Fundamentals of Ballroom and Square Dance
[2]222 Fundamentals of Badminton and Golf
[2]227 Fundamentals of Folk Dance
[2]230 Fundamentals of Soccer — Speedball for Women
[2]231 Fundamentals of Basketball for Women
[2]232 Fundamentals of Softball and Field Hockey for Women
[2]233 Fundamentals of Gymnastics for Women
[2]240 Fundamentals of Elementary Modern Dance
[2]241 Fundamentals of Intermediate Modern Dance
[2]242 Fundamentals of Advanced Modern Dance

Upper Division

400 Social Recreation Leadership
[2]460 Methods in Physical Education
461 Lifesaving
462 Water Safety Instructor's Course
463 Methods of Teaching Ballroom and Square Dance
464 Methods of Teaching Tennis and Badminton
467 Methods of Teaching Modern and Folk Dance
468 Methods of Teaching Team Sports for Women
469 Methods of Teaching Tumbling and Gymnastics for Women
480 Kinesiology
481 Physiology of Muscular Activity
482 Physical Education for the Exceptional Student
485 Interpretation of Physical Education Objectives
486 Administration of Physical Education
487 Tests and Measurements in Physical Education

PE TEACHING MINOR WOMEN

Courses	Credits
220, 222, 230, 231, 232, 233 (any two)	2
227 or 176	1
240, 241, 242, 170, 171, 172 (any two)	2
206	3
400	3
480	3
460	2
468, 469, 464 (any one))	2
485 or 486	3

Three to five credits of electives, 24 to 26 total credits.

Composite Major in Physical Education (78-79 credits). In the composite major, physical education will be the dominant area. Any two of the following may be

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[1]The fundamentals series is a prerequisite to PE 460 and the Methods of Teaching series. PE 460 should precede Methods of Teaching.

[2]Fundamentals of Sports series, Physical Education Labs, Dance Labs are a prerequisite to PE 460 and Methods of Teaching.

used as supporting areas: Health, Dance, Recreation.

Physical Education — Men (Dominant Area)

PE 200	Intro to Physical Education	2
RE 400	Social Recreation Leadership	3
PE 203	Administration of Intramural Sports for Men	3
PE 480	Kinesiology	3
PE 481	Physiology of Muscular Activity	3
	or	
PE 482	PE for the Exceptional Student	3
PE 485	Interpretation of PE Objectives	3
PE 486	Administration of Physical Education	3
PE 463	Methods of Teaching Ballroom and Square Dance	2
PE 464	Methods of Teaching Tennis and Badminton	2
PE 465	Methods of Teaching Volleyball, Speedball and Wrestling	2
PE 466	Methods in Teaching Tumbling and Gymnastics	2
PE 470	Football Coaching Methods	2
	or	
PE 471	Basketball Coaching Methods	2
	or	
PE 472	Track and Field Coaching Methods (any two)	2
PE 461	Senior Lifesaving	2
	Total	34

Physical Education—Women (Dominant Area)

PE 200	Intro to Physical Education	2
RE 400	Social Recreation Leadership	3
PE 206	Administration of Intramural Sports for Women	3
PE 480	Kinesiology	3
PE 481	Physiology or Muscular Activity	3
	or	
PE 482	Physical Education for the Exceptional Student	3
PE 485	Interpretation of PE Objectives	3
PE 486	Administration of Physical Education	3
PE 220-222	Fundamentals of Sports	4
PE 230, 231, 232, 233		4
PE 464	Methods of Teaching Tennis and Badminton	2
PE 469	Methods of Teaching Tumbling and Gymnastics	2
PE 468	Methods of Teaching Team Sports for Women	3
PE 461	Senior Lifesaving	2
	Total	35

Supportive Areas

Health: (Required)

HE 459	Methods and Materials in Health Education	3
PubH 115	Personal Health	2
HE 440	Alcohol and Tobacco Education	3

Electives: select six additional credits from Group 1 and six from Group 2.

Group I:		
HE 190	First Aid	3
HE 458	School Health Curriculum	3
FN 122	Principle of Nutrition	3
SW 365	Mental Health	3
Psych 270	Mental Hygiene or	3
PubH 580	Current Problems in Community Health	2
Group II:		
CD 320	Preparation for Marriage	3
HE 430	Safety Education	3
PubH 410	Environmental Sanitation	4
PubH 50	Fundamentals of Public Health	3
	Total	20

Dance: (Required)

240, 241, 242	Dance Lab or	3
170, 171, 172	Modern Dance	3
227 or 176	Dance Lab or Folk Dance	1
463 or 315	Methods of Teaching Ballroom and Square Dance	2
467	Methods of Teaching Modern and Folk Dance	2
311 or 312	Dance Composition	2

Electives: select 10 additional credits from the following:

202 or 310	Rhythms and Dramatic Games or Creativity Rhythms	2-3
221 or 178	Fund of Ballroom and Square Dance or Ballroom Dance	1
314	Dance History	3
179	Latin American Ballroom Dance	1
173	Beginning Square Dance	1
Thart 172, 372	Dance for Theatre	3
Thart 150	Stagecraft	2
Thart 152	Make-up	1
	Total	10

Recreation (Required)

RE 410	Internshipin Recreation	3
RE 404	Playground and Camp Organization and Administration	3
RE 550	Recreation Areas and Facilities	3
RE 409	Camp Counseling anr Camp Crafts	3
RE 552	Organization of Recreation	3

Electives: select nine additional credits from the following:

RE 406	Outdoor Survival and Recreation	3
RE 301	Physical Education in the Elementary School	3
ITE 110	Industrial Crafts	3
Thart 558	Creative Dramatics	3
For Sci 350	Recreation Use of Wildland	3
FCD 210	Human Growth and Development	3
Speech 518	Storytelling	3
LAEP 530	Park and Recreational Planning	3

PS	111	American State and Local Government	3
		Total	24

Elementary Physical Education Minor for Elementary Education Majors: 21 credits required.

Required Courses			Credits
PE	202	Rhythm and Dramatic Games	2
or PE	310	Creative Rhythms for Schools	3
PE	301	Techniques in Game Leadership	3
PE	177	Physical Education in the Elementary School	3
or PE	302	Materials and Methods in Elementary Physical Education	3

Additional credits to be selected from the following courses: PE 163, 221, 224 or 233, 200, 225, 203 or 206, 230, 320, 336; HE 190; RE 550.

Health Education Major

I) Required foundation courses (can be used as group-fillers):

Physiology 130
Bacteriology 111 or 301
Foods and Nutrition 122
Psychology 101
Sociology 101 or Anthropology 101
American Government requirement (Political Science 110, History, 110 or Economics 200.
Chemistry is recommended as a group-filler and is required for advanced physiology.

An approved program of a minimum of 45 credits should be selected from the following courses:

II) Required Courses (24 credits):

HE	190	First Aid	3
HE	430	Safety Education	3
HE	440	Alcohol and Tobacco Education	3
HE	458	School Health Curriculum	3
HE	459	Methods and Materials in Health Education	3
HE	442	Drug Use and Abuse	3
PubH	115	Personal Health	2
PubH	410	Environmental Sanitation	4
Psych	270	Mental Health (Social Work 110 may be used)	3

III) Electives:

A) A minimum of five credits selected from the following courses:

HE	217	School and Community Health Workshop	2
PubH	580	Problems in Community Health	2
PubH	410	Environmental Health	3
PubH	451	Organization and Administration of Health Agencies	3

B) A minimum of 10 credits selected from the following courses:

F&CD	320	Marriage	3
F&CD	440	Methods and Procedures in Family Life Education	3
PubH	452	Family Health	3
PE 481 or		482 Kinesiology or Aadapted Physical Education	3
Psych	321	Abnormal Psychology	3
Psych	614	Adolescent Psychology	3
Biol	512	Principles of Genetics	5

An additional 36 credits in Education is required for certification. Public Health 155 will be counted toward certification and has not been listed above.

Teaching Minor in Health Education. The following foundation science courses are recommended for a teaching minor: Biology 101, Psychology 101, Physiology 130, Socilogy 101, Chemistry, Physics.

Required Courses:

PubH	150	Environmental Health	4
PubH	115	Personal Health	2
HE	190	First Aid	3
HE	440	Alcohol and Tobacco Education	3
Foods	122	Principles of Nutrition	3
Psych	145	Mental Hygiene or	3
SW	365	Mental Health	3
HE	458	School Health Curriculum	3
HE	459	Methods and Materials in Health Education	3

Recommended Courses:

Bact	111	Elementary Bacteriology	5
HE	430	Safety Education	3
CD	320	Preparation for Marriage and Family Living	3
Biol	512	Genetics	5
PubH	150	Elementary Public Health	3
Psych	321	Abnormal Psychology	3
HE	442	Drug Use and Abuse	3

Recreation Education Major. The Division of Recreation Education offers a program of study leading to a Bachelor of Science degree. The program primarily prepares administrators, supervisors, leaders, and research workers in community recreation. Opportunties are also available for preparation in camping, park administration, private recreation, and youth agencies. Because of the varied knowledge and skill requirements for various job dis-

ciplines, the recreation curriculum consists of the following: I) core courses required of all Recreation majors, 26 credits; II) elective courses, 24 credits selected by the student and chairman of the Recreation Division to prepare the student for his area of specialization; III) internship, 12 credits on-the-job work experience one quarter for a recreation agency.

I) Core Curriculum.

RE 100	Introduction to Recreation	2
RE 400	Social Recreation Leadership	3
RE 404	Administration of Playgrounds and Community Centers	3
RE 550	Planning Recreation Areas and Facilities	3
RE 551	Philosophy of Recreation	3
RE 409	Camp Counseling and Crafts	3
RE 552	Organization of Recreation	3
PE 203	Organization of Intramural Sports (206 for women)	3
PE 460	Methods in Physical Education	3
	Total	26

II) Electives. In addition to the core courses a student must select 24 credits from an approved list. These courses must have the approval of the Recreation Division chairman and should compliment his major area of emphasis to prepare him for specialization.

III) Internship in Recreation. REP 410[1] is required before the Senior year. It consists of one quarter full time working for a recreation agency.

Recreation Minor. A minor in Recreation Education must consist of 18 credits from core courses with Recreation Division approval.

Graduate Study

The department offers courses leading to the Master of Science degree in Health Education, Physical Education, or Recreation. Before admission to candidacy for the degree, a student must complete the equivalent of a bachelor's degree in Physical Education at USU and additional requirements as prescribed by the School of Graduate Studies. Refer to the Graduate Catalog.

The EdD degree in Curriculum Development and Supervision is offered in the College of Education. Candidates may specialize and do research in Physical Education as a part of the requirements. See Graduate Catalog.

[1]Prerequisite for RE 550, 551, 552.

Health, Physical Education and Recreation Courses

Activity Courses for Men

100. (1) Basic Physical Education. (1F, W, Sp) **Staff**

105. (12) Track and Field. (1Sp) **Maughan**

106. (10) Indoor Track and Field. (1W) **Maughan**

107. (63) Cross Country. (1F) **Maughan**

111. (27) Weight Training (1F, W, Sp) **Staff**

112. (new) Advanced Physical Conditioning. (1W, Sp) **Staff**

114. (37) Trampoline. (1F, W) **Staff**

116. (38) Tumbling and Gymnastics. (1F, W) **Staff**

122. (new) Handball. (1F, W, Sp) **Staff**

130. (7) Wrestling. (1F, W, Sp) **Staff**

131. (8) Inter. Wrestling (1F, W, Sp.) **Staff**

132. (36) Self Defense. (1W) **Staff**

140. (6) Football. (non-varsity) (1W) **Staff**

141. (2) Freshman Football. (1F) **Staff**

142. (29) Varsity Football. (1F) **Staff**

144. (15) Softball. (1Sp) **Staff**

145. (11) Baseball. (1Sp) **Staff**

147. (23) Basketball. (1F, W, Sp) **Staff**

149. (35) Volleyball. (1F, W, Sp) **Staff**

152. (34) Soccer. (1F) **Staff**

162. (16) Swimming. (1F, W, Sp) **Staff**

163. (17) Intermediate Swimming. (1F, W, Sp) **Staff**

Activity Courses for Women

100. (1) Basic Physical Education. (1F, W, Sp) Staff

104. (14) Track and Field Activities. (1F, Sp) Staff

113. (60) Body Conditioning. (1F, W, Sp) Staff

115. (44) Tumbling and Stunts (1F, W, Sp) Staff

117. (58) Intermediate Tumbling and Gymnastics. (1W, Sp) Staff

143. (42) Softball. (1Sp) Staff

146. (41) Basketball. (1W) Staff

148. (40) Volleyball. (1F, W) Staff

151. (39) Soccer-Speedball. (1F) Staff

153. (43) Field Hockey. (1Sp) Staff

160. (52) Swimming. (1F, W, Sp) Staff

161. (56) Intermediate Swimming. (1F, W, Sp) Staff

166. (157) Synchronized Swimming. (1W, Sp) Staff

174. (54) Elementary Precision Rhythms. A course dealing with elementary marching tactics designed for the precision drill performer. (1W) **Fullmer**

175. (65) Advanced Precision Rhythms. Advanced marching skills, individual and group choreography and advanced routines. (1W) **Fullmer**

Activity Courses for Men and Women

101. (3) Skiing. (1W, Sp) Staff

102. (19) Intermediate Skiing. (1W) Staff

103. (33) Advanced Skiing. (1W) Staff

108. (25) Jogging. (1F, W, Sp) **Maughan**

109. (13) Bowling. (1F, W, Sp) Staff

110. (63) Intermediate Bowling. (1F, W, Sp) Staff

118. (61) Archery. (1F, W, Sp) Staff

119. (62) Intermediate Archery. (1W, Sp) Staff

120. (73) Golf. (1F, Sp) Staff

121. (88) Intermediate Golf. (1F, Sp) Staff

123. (45) Adapted Physical Education. Designed to meet the needs of individuals who are unable to participate in the required program of Physical Education. Students must obtain permission from the head of the department before registering. (1F, W, Sp) Staff

133. (9) Fencing. (1F, W, Sp) **Downs**

134. (66) Badminton. (1F, W, Sp) Staff

135. (69) Intermediate Badminton. (1F, W, Sp) Staff

136. (67) Tennis. (1F, Sp) Staff

137. (90) Intermediate Tennis. (1F, Sp) Staff

164. (18) Advanced Swimming. (1F, W, Sp) Staff

165. (28) Diving. Staff

170. (48) Elementary Modern Dance. (1F, W, Sp) Staff

171. (49) Intermediate Modern Dance, (1F, W, Sp) Staff

172. (51) Advanced Modern Dance. (1W, Sp) Staff

173. (53) Square Dance. (1F, W, Sp.) **Burnett**

176. (68) International Folk Dance. (1F, W, Sp) **Brown**

177. (new) Intermediate International Folk Dance. (1F, W, Sp) **Brown**

178. (72) Ballroom Dance. (1F, W, Sp) Staff

179. (76) Latin American Ballroom Dance. (1F, W, Sp) Staff

461. (74) Lifesaving. Prerequisite: Red Cross Swimmer's card or permission of instructor. American Red Cross certificate is given to students who pass the examination. (2F, W) **Rasmussen**

462. (132) Water Safety Instructor's Course. Prerequisites: American Red Cross Senior Lifesaving certificate and permission of the instructor. Attention is given methods of teaching swimming, diving, lifesaving and use of small water crafts. American Red Cross certification is given students who pass the exam. (2W, Sp) **Rasmussen**

Professional Courses in Physical Education

200. (75) Introduction to Physical Education. History, philosophy, theory and practice of physical education. (2F, W) **McClellan**

202. (81) Rhythmic Program for Elementary School. Rhythms for young children; its use in creative movement. Methods of presenting and developing rhythms. (2F) **Fuller**

203. (85) Administration of Intramural Sports for men. Sports, tournaments, units of competition, scoring systems, and coordination of

intramural sports with physical education and athletics in secondary schools. (3F, W) **Mendini**

204. (86) Sports Officiating for Men. Knowledge of the rules and mechanics of officiating football, touch football, basketball, wrestling and boxing. Attention is also given to the proper instruction of other game officials such as timers, scorers and game administrators. (2F) **Mendini**

205. (87) Sports Officiating for Men. Knowledge of the rules and mechanics of officiating volleyball, ski meets, water basketball, badminton and softball. Techniques of officiating basketball are reviewed. Attention given to proper instruction of other game officials such as timers, scorers and game administrators. (2W) **Mendini**

206. (92) Administration of Intramural Sports for Women. Organization of sports days, play days, tournaments, and intramural activities. (3W) **Downs**

207. (93) Sports Officiating for Women. (2F, W) **Gardner**

208. (97) Body Dynamics (2) **Nelson**

220. (20) Fundamentals of Tennis and Archery. (1F, Sp) **Staff**

221. (21) Fundamentals of Ballroom and Square Dance. (1F, W) **Staff**

222. (22) Fundamentals of Badminton and Golf. (1F, Sp) **Staff**

223. (30) Fundamentals of Wrestling and Weight Training. (1W, Sp) **Staff**

224. (31) Fundamentals of Tumbling and Gymnastics — Men. (1F, W) **Staff**

225. (32) Fundamentals of Speedball and Volleyball — Men. (1F, Sp) **Staff**

226. (89) Fundamentals of Drill and Pep Clubs. (2Sp) **Fullmer**

227. (24) Fundamentals of Folk Dance. (1F, Sp) **Brown**

230. (94) Fundamentals of Soccer-Speedball for Women. (1F) **Gardner**

231. (95) Fundamentals of Basketball for Women. (1W) **Gardner**

232. (96) Fundamentals of Softball and Field Hockey for Women. (1Sp) **Gardner**

233. (98) Fundamentals of Gymnastics for Women. (1F, Sp) **Chase**

240. (77) Fundamentals of Elementary Modern Dance. (1F) **Fullmer**

241. (78) Fundamentals of Intermediate Modern Dance. (1W) **Fullmer**

242. (79) Fundamentals of Advanced Modern Dance. (1Sp) **Fullmer**

301. (177) Physical Education in the Elementary Schools. Designed to give a philosophy of physical education in the elementary school. Emphasis is on program planning, teaching techniques, the direction and participation in elementary physical education activities and the selection of activities that will help satisfy the needs of the elementary school child. (3F, W) **Downs**

302. (182) Methods of Teaching Elementary School Physical Education. Curriculum, facilities, equipment, and the teaching of activities. Emphasis on activities as specified in the Utah State Course of Study for the elementary school. (3Sp) **Downs**

310. (111) Movement Exploration for Elementary Schools. Methods and materials used in guiding creative rhythmic experiences of students. (3W) **Fullmer**

311. (102) Composition in Modern Dance. Experience in individual composing based upon the beginning elements of modern dance. (2F) **Fullmer**

312. (103) Composition in Modern Dance. Experience in group composing through the various forms and stimuli of modern dance. (2W) **Fullmer**

313. (104) Dance Production. Composition done independently. Participation in a performance required. Lighting, staging, costume, and make-up applied to a dance concert. (2Sp) **Fullmer**

314. (140) Dance History. A history of dance from the primitive through Greek, medieval and Renaissance periods into the theatrical dance forms: ballet and modern. (3F) **Fuller**

315. (153) Leadership in Dance. An advanced class in dance leadership to meet needs of students who expect to teach social or square dancing in schools or churches. Prerequisite: One quarter of social or square dancing. A syllabus is required. (2Sp) **Staff**

320. (113) Construction of Physical Education Equipment for Elementary Schools. (3Sp) **Downs**

321. (116) Methods of Teaching Skiing. (2F) **Staff**

322. (119) Prevention and Care of Athletic Injuries. (2Sp) **Staff**

323. (123) Methods of Coaching Womens Sports. Training, strategy, sports skill, and techniques of coaching volleyball, basketball, and softball. (2Sp) **Gardner**

330. (126) Curriculum and Methods in Physical Education for the Handicapped. (3F, Sp) **Downs**

460. (120) Methods in Physical Education. Student assists in teaching the service program under direction of a staff member. He begins his first practical training in teacher preparation. Classwork consists of methods of techniques of teaching physical education and relates directly to the assistant teaching program. (3F, W, Sp) **Downs**

461. (74) Lifesaving. The American Red Cross course in senior lifesaving is covered. (2F, W, Sp) **Rasmussen**

462. (132) Water Safety Instructor's Course. Prerequisites: American Red Cross Senior Lifesaving certificate and permission of the instructor. Attention is given methods of teaching swimming, diving, lifesaving, and use of small watercrafts. American Red Cross certification is given students who pass the exam. (2W, Sp) **Rasmussen**

463. (121) Methods of Teaching Ballroom and Square Dance. Prerequisite: PE 460. (2F, W) **Staff**

464. (122) Methods of Teaching Tennis and Badminton. Prerequisite: PE 460. (2F, Sp) **Staff**

465. (130) Methods of Teaching Volleyball, Speedball, Wrestling. Prerequisite: PE 460. (2F, Sp) **Staff**

466. (131) Methods of Teaching Tumbling and Gymnastics. Prerequisite: PE 460. (2W, Sp) **Staff**

467. (150) Methods of Teaching Modern and Folk Dance. (2W, Sp) **Fullmer**

468. (160) Methods of Teaching Team Sports for Women. Designed to develop teaching techniques in soccer, speedball, basketball, softball, field hockey and volleyball. (3F, Sp) **Pearce**

469. (165) Methods of Teaching Tumbling and Gymnastics. (2W, Sp) Chase

470. (188) Football Coaching Methods. Prerequisite: PE 460. (2W) **Maughan**

471. (189) Basketball Coaching Methods. Prerequisite: PE 460. (2F) **Anderson**

472. (190) Track and Field Coaching Methods. Prerequisite:: PE 460. (2Sp) **Maughan**

473. (191) Baseball Coaching Methods. Prerequisite: PE 460. (2Sp) **Staff**

480. (106) Kinesiology. The science of movement. Includes a study of the structure of the human body in terms of its use in activity; a mechanical analysis of all types of activity based upon principles of good body mechanics; methods of developing and using the human body. Prerequisite: Physiology 103. (3W, Sp) **Nelson**

481. (107) Physiology of Muscular Activity. A study of the physiological functions of the human body in various types of activity. The course includes a detailed study of the physiological changes that occur during all kinds of activity. Physiological principles are then applied to physical education. Prerequisite: Physiology 130. (3F, W) **Nalder**

482. (108) Physical Education for the Exceptional Student. Includes administration of an adapted physical education program, a study of abnormal problems in body mechanics, athletic injuries and their treatment, therapeutic exercises, and principles dealing with abnormal conditions found in the physical education program. Prerequisite: Physiology 103. (3F, Sp) **Nelson**

485. (183) Interpretation of Physical Education Objectives. Results and values of physical education activities in terms of development, adjustment and standards. (3F, W) **Hunsaker**

486. (184) Administration of Physical Education. Administration procedures in Physical Education in the high school; curriculum and program planning. (3W, Sp) **Staff**

487. (192) Tests and Measurements in Physical Education. Practical studies of tests and techniques of test construction. (3F, W) **Hunsaker, McClellan**

Professional Courses in Recreation Education

100. (65) Introduction to Recreation. Designed to give the student a basic knowledge of the recreation movement with emphasis on trends, history, philosophy, professional organizations, and employment opportunities. (3F) **Boyce**

160. (35) Western Horsemanship. Grooming, saddling, bridling, mounting, seat and hands, horseback riding both bareback and on western saddle. For students with limited or no previous riding experience. Three laboratories. $15 fee. (3F) **Staff**

400. (83) Social Recreation Leadership. Lectures, demonstrations, and practical experience in leading people in a social recreation setting. Attention is given to philosophy, technique, qualifications, selection of material, organization, conducting, leading and supervising. (3F, W, Sp) **Burnett**

401. (124) Scoutmaster's Basic Training. The standard training course approved by the National BSA Council and includes the following: plans and methods in organization and leadership, program planning, meeting, hiking, and camping. (2Sp) **Boyce**

402. (152) Outdoor Education. Instructional programs involving use of outdoor settings, school camps, field trips, and implications for curriculum. (1Su) **Boyce**

403. (159) School Recreation Leadership. Techniques of planning, organizing, and leading recreational activities in a school setting; special emphasis given to leadership in classroom, multipurpose room and playground areas. (3F, Su) **Burnett**

404. (170) Organization and Administration of Playgrounds and Community Centers. Analysis of best practices dealing with promotion, training, budgeting, scheduling, programming, organizations, safety and public relations. (3F) **Boyce**

405. (171) Programming in Recreation Therapy. A study of physical and social implications and needs of individuals in hospitals and rest homes. Designing special programs to fill these needs using all available special methods and feasible activities. (3W) **Burnett**

406. (175) Outdoor Survival and Recreation. Lectures and field trips to teach students ways of living in the wilderness under adverse weather conditions and how to participate and enjoy outdoor winter sports. Students must provide adequate clothing for field trips. (3W) **Burnett**

407. (176) Leadership in Camping. Techniques of organizing and planning outdoor recreational camping experiences. Emphasis is placed on backpacking, hiking, and survival in primitive areas. The class includes a one-week wilderness camping experience. (2Su) **Boyce**

408. (128) Administration of Camping for the Handicapped.

409. (179) Camp Counseling and Camp Craft. Different types of camps and their organization, supervision, equipment, staff, and safety. Several short hikes and outdoor camping experiences. Each student is expected to participate in these outdoor experiences. (3Sp) **Boyce**

410. (157) Internship in Recreation. Designed to give students practical experience working full time for a recreation organization for one quarter. (12Sp, Su) **Burnett**

550. (172) Recreation Areas and Facilities. A study of the basic planning procedures, techniques, and methods for community recreation and school physical education facilities. (3W) **Boyce**

551. (173) Philosophy of Recreation. Provides insight into the problems Americans face as the result of increased leisure. Exploration of possible solutions to these problems through the medium of recreation. (3W) **Burnett**

552. (196) Organization of Recreation. Problems of organization and administration of community recreation departments, including staff, activities, program of activities, and office management. Problems of recreation surveys, legislation, property acquisition, finances, construction and maintenance, and securing community and school cooperation in a united recreational program. (3Sp) **Burnett**

600. (new) Problems in Recreation. Study of issues of public and school recreation, youth-serving organizations, and community groups using case studies and discussion of current issues. Emphasis will be on recognizing signs that lead to problems. (3F, Su) **Burnett**

601. (193) Leadership in Recreation. A group approach to improvement and innovation in leadership and supervisory skills. Familiarization with administrative skills and duties through discussion and lab approach. (3W, Su) **Staff**

680. (293) Seminar in Recreation. Student presentation of thesis and project studies. Informal discussions, critical analysis of problems, informal lectures by invited speakers and class members. (3Sp, Su) **Staff**

Professional Courses in Health Education

190. (55) First Aid. Standard and advanced American National Red Cross courses in first aid, with emphasis on practical use of the knowledge in various occupations. Detailed demonstrations and practice. American Red Cross first aid certificates may be obtained by students who pass a satisfactory examination. (3F, W, Sp) **Mendini**

430. (135) Safety Education. 1) The needs for safety education; 2) role of the school in a program for safety; 3) methods and materials for teaching, discussions, and readings, stressing various aspects of safety in many areas. (3W, Sp) **Fuller**

431. (154) First Aid Instructor's Course. Prerequisite: American Red Cross advanced first aid certificate. Attention is given to methods of teaching first aid. Detailed demonstration and practice is given. American Red Cross first aid certificate is given to students who pass the examination. (2Sp) **Mendini, Staff**

440. (145) Alcohol and Tobacco Education. Alcohol and tobacco problems are considered from a physiological, psychological, sociological, educational, historical, and legal treatise. Development of an educational program. (3Sp, Su) **Nelson**

442. (193) Drug Use and Abuse. Positive and negative aspects of drug use and abuse. Includes physiological, psychological, and sociological implication of the current drug problems. Focuses on preparing the teacher as recommended by the Utah State Board of Education Curriculum Guide for Health Education. (3Sp) **Nalder**

456. (156) School Health for Health Teachers. For health and physical education teachers. Content of the secondary school health courses. Health problems of secondary students. Helpful school environment and program. School health laws and practices. (3F, W, Sp) **Pearce**

458. (158) The School Health Curriculum. Topics include the scope and socio-scientific basis for health education; organization for health education development; emphasis on the scheduling and sequence of health instruction in primary grades, intermediate grades, junior high school, high school, and health education in college; and evaluation of outcome. Prerequisite: Public Health 115. (3) **Pearce**

459. (163) Methods and Materials in Health Education. The nature of health education in the school and community; health needs of the school child; health education curriculum; methodology in the teaching of health; resource materials of health education; and measurement and evaluation of the total health program. Prerequisite: Public Health 115. (3) **Pearce**

520. (144) Alcohol and Drug Education Institute. (1Su) **Pearce**

620. (191) Interpretation of the Health Program. Provides an in-depth view of the school services area. Interpretation of diagnostic and screening tests used in the comprehensive appraisal of the school child. (3) **Staff**

Graduate Courses in Physical Education

590. (250) Independent Study. Credit arranged. **Staff**

630. (206) Analysis of Sports Performance. A mechanical and physiological analysis of all types of sports performance based upon principles of movement and body mechanics. Advanced methods of developing and using the human body. Includes slow-motion photography, physiological bases and actual performance for employing the analysis. (3W, Su) **Nelson**

631. (new) Advanced Exercise Physiology. A study of physiological changes that occur in the human body while exercising. Emphasis is given to an in-depth understanding of the physiological reasons for change during exercise and the relationship that such changes have for physical activity. Supplemented with extensive laboratory application. (3W, Su) **Nalder**

633. (207) Problems of Athletics. Relates athletic administration, public relations, athletic management, budgets, inventories, purchase and care of equipment, schedules, facilities, and department responsibility to administration, school, and community. **Staff**

640. (new) Exercise Physiology Instrumentation. A basic understanding of the operation of electronic and non-electronic equipment in the measurement of physical variables. (3Sp, Su) **Nalder**

642. (282) Curriculum in Physical Education. Objectives and needs of elementary, junior, and senior high physical education students. Various sports and activities will be studied and evaluated to determine their potential in developing the needs of students at each age and area level. Includes current practices, problems and curriculum trends. (3W, Su) **McClellan**

651. (295) Problems and Issues in Health and Physical Education. Selected problems are studied through the use of literature and discussion as they apply to the individual and the group. Individual problems are emphasized. (3F, Sp) **Staff**

654. (275) Philosophical Basis of Health and Physical Education. Divergent origins, conditions, leaders, and forces giving rise to current basic beliefs about health, physical education, and recreation. Development of individual professional philosophies. (3F, Su) **McClellan**

660. (294) Research and Evaluation in Physical Education. Methods, techniques, purposes, and interpretation of various kinds of research. Practical application in the conduct of a research project is utilized during the class. (3F, Sp) **Staff**

670. (new) Psychological Aspects of Sports Performance. Designed to study the athlete with stress on individual psychological factors contributing to such difficulties as: injury histories, success phobia, unusual depression, non-cooperation, anxiety, non-interaction, the self-centered "manipulator," etc. The role of the coach in motivating athletes. Lectures, discussion, and case histories. (2W, Su) **Nelson**

683. (299) Seminar in Physical Education. Motor learning. Credit arranged. (W) **McClellan**

697. (271) Research and Thesis Writing. Credit arranged. **Staff**

699. (400) Continuing Graduate Advisement. Credit arranged. **Staff**

*Department of

History and Geography

Head: Associate Professor William F. Lye
Office in Main 317

Professors Stanford O. Cazier, S. George Ellsworth, Edwin L. Peterson

Associate Professor Douglas D. Alder

Assistant Professors C. Blythe Ahlstrom, C. Robert Cole, Stanford E. Demars, Derrick J. Thom, Frederick J. Yonce

Instructors Clifford B. Craig, R. Edward Glatfelter, Michael L. Nicholls, Lucile Pratt

Degrees: Bachelor of Science (BS), Bachelor of Arts (BA), Master of Science (MS), Master of Arts (MA)

Majors: History and Geography

For a **major in History** the student must complete 45 credits in History. The student should complete as soon as possible survey courses in American Civilization, History 170, and either Comparative World Civilizations, History 101, 102, and 103, or Western Civilization, History 104 and 105. The student should then take such upper division courses as will satisfy his particular interest, but History 300, Sources and Literature of History, is especially recommended.

Those who plan to do graduate work in History should complete at least two years of a foreign language as an undergraduate. During the Senior year they are also urged to take the Graduate Record Examinations.

Those who plan to obtain a teaching certificate should consult with the College of Education during the Sophomore year to assure eligibility for teacher training and the right course program for certification.

A grade of "C" or better is required in any course in History used to meet the requirements for a major in History. A 2.5 grade point average in the major is required for graduation.

The study of History requires an understanding of many fields of human endeavor. The student majoring in History should select a minor and take electives in fields closely related to History, such as Economics, Geography, Political Science, and Sociology. Especially recommended are courses in the history of art, literature, music, drama, political thought, economics, social thought, and philosophy.

A minor in History consists of 18 or more credits. History 101, 102, and 103, or History 104, 105, 170 and 300 are recommended.

Teaching Major in History. History constitutes the major subject matter in the Social Studies curriculum of the secondary schools. Those who plan to teach in the secondary schools should either 1) pursue work leading to the major in History and to the secondary certificate, or 2) pursue work leading to the teaching major in History and the secondary certificate. The former plan is pre-

*In College of Humanities, Arts and Social Sciences.

ferred. The History faculty advises History majors; teaching majors may be advised by either the History faculty or the Education faculty.

For a teaching major in History the student must complete a minimum of 40 credits in History and a minimum of 24 credits in a minor. The teaching major should begin his program with History 101, 102, and 103, or History 104, 105, and 170. History 300 should be taken before practice teaching. A teaching major in History should include a broad foundation in the Social Sciences, and therefore the minor should be in one of the Social Sciences. Economics, Political Science, Geography, and Sociology are recommended. Upper division courses in History and work in the minor and allied fields should be selected in consultation with one's adviser.

Teaching Minor in History. A teaching minor in History consists of 24 credits. History 101, 102, and 103, or History 104, 105, 170, and 300 are especially recommended.

An "application for admission to teacher education" should ordinarily be completed during the Sophomore year (see College of Education for requirements). Approval is a prerequisite to certification candidacy and to enrollment in Education and Psychology courses.

Graduate Study

College Teaching. There is a demand for college and university history teachers. Students of capacity and dedication are encouraged to give serious consideration to this profession. Appointment to a major college department usually requires the PhD degree. Interested students should consult History faculty members, and check on fellowships and assistantships.

Master of Science or Master of Arts in History. Programs for either of the master's degrees are described in the Graduate School Catalog. Students interested in these programs should consult the Graduate Catalog and a member of the History faculty.

American Studies. The Departments of English, History, and Political Science cooperate in administering the graduate program leading to the Master of Science and the Master of Arts degree in American Studies. See the Catalog section on English for information on this program.

Career Opportunities. A solid preparation in History qualifies a person for a career in several fields. Most majors in History teach in the public schools or serve in colleges and universities as teachers and authors. Careers outside the classroom are also open to specialists in History. Libraries and archives on the city, county, state, and national levels frequently hire History majors. History majors who also have strong preparation in Political Science and Economics find opportunity in various branches of the federal government and the legal profession. Increasingly corporations, businesses, and the service industries are looking for people with a liberal education, and History certainly qualifies as one of the liberal arts.

History majors are encouraged to achieve that scholastic level which permits them to participate in the Honors Program and to affiliate with Phi Alpha Theta, the national honorary history fraternity. Professor C. Blythe Ahlstrom is the departmental adviser to both programs. Interested persons should see him.

History Courses

Lower Division

101. (1) Comparative Civilizations: Ancient and Medieval. A comparative survey of the major civilizations of the world concerned with political, social, economic, artistic, and intellectual attainments of mankind. From earliest times to about 1500 A.D. (3F) **Lye**

102. (2) Comparative Civilizations: Early Modern. A comparative survey of major world civilizations during the period of transformation to European domination. From about 1500 to 1850. (3W) **Lye**

103. (3) Comparative Civilizations: Modern. A comparative survey of major world civilizations in the modern period. Special attention given to political, social, intellectual, and technological transformations of the past century. (3Sp) **Lye**

104. (4) Western Civilizations: Ancient and Medieval. A survey of European civilization from its origins to about 1500 A.D. Emphasis on cultural, political, religious, social, economic, intellectual, and artistic achievements. (5F, W, Sp) **Cole, Ellsworth**

105. (5) Western Civilization: Modern. A survey of European civilization from the Reformation to the present day. (5F, W, Sp) **Alder, Glatfelter**

170. (20) American Civilization. The fundamentals of American history. Successful completion of this course meets the American Institutions requirement established by the State Legislature. (5F, W, Sp) **Ahlstrom, Cazier, Nicholls, Yonce**

Independent Studies

291. (239) Independent Studies. Credit arranged. (F, W, Sp) **Staff**

295. (95) Issues. (1F, W, Sp) **Staff**

297. (97) Topics. (1F, W, Sp) **Staff**

299. (99) Challenges. Credit arranged. (F, W, Sp) **Staff**

Upper Division

300. (190) Sources and Literature of History. General reference works, bibliographies, and guides to the study of European, American, and Asian history. For all persons preparing to teach or write history. Prerequsites: History 101, 102, and 103, or 104 and 105, and 170. May be taken as early as the Sophomore year upon completion of prerequisites. (3F, W, Sp) **Alder, Ellsworth**

Period Survey Courses

Europe

304. (105) Greek History. Greek civilization to the Roman conquest, 146 B.C. Emphasizes political, social, intellectual, and artistic developments and contributions. (5F) **Ellsworth**

306. (106) Roman History. From the earliest times to the decline of the Roman Empire in the West in the 5th century A.D. (5W) **Ellsworth**

308. (107) The Rise of Christianity. The early Christian Church, with special emphasis on a study of the teachings and impact of Paul's letters. The Church in its Hebrew setting, its growth and development in the Greco-Roman world. (5) **Staff**

311. (111) Medieval Europe (500-1500 A.D.). Political, economic, social, and cultural developments during the Middle Ages. (3Sp) **Ellsworth**

321. (124) Renaissance and Reformation (1250-1600 A.D.). The Italian Renaissance and the Reformation, their spread in Europe. The transition from medieval to modern Europe in terms of political, economic, religious, social, and intellectual systems and values. (5W) **Cole**

322. (125) Ages of Absolutism and Enlightenment (1555-1789 A.D.). The institutions and ideas which produced modern European attitudes toward revolution and reaction, and the practical nature of politics and economics during the age of absolutism and enlightened despotism. (3) **Cole**

324. (126) Revolutionary and Imperial France (1789-1815). The origins, causes and events of the French Revolution examined in terms of social, political, economic, and intellectual factors, including a vertical analysis of the roots of mass nationalism and dictatorship. (3F) **Cole**

325. (127) Nineteenth-Century Europe (1815-1914). Reaction, nationalism, imperialism, liberalism, and socialism against a background of politics, economics and diplomacy. (3Sp) **Cole**

327. (128) Twentieth-Century World. Political and economic developments in Europe, America, Asia, and Africa since the end of World War I. (3Sp) **Alder, Glatfelter**

Africa

351. (151) Traditional Africa. Geography, ethnology, and early history of Africa to the coming of the colonial powers. (3F) **Lye**

352. (152) Colonial and Modern Africa. From the coming of the colonial powers, through the Colonial Period to the present movements of independence. (3W) **Lye**

Asia

361. (175) Traditional East Asia. Development of the civilizations of China, Japan, and Korea from their origins to the time of the Ch'ing Dynasty in China. (3F) **Glatfelter**

362. (176) Modernization in East Asia. The modern transformation of traditional cultures of China, Japan and Korea during the last two centuries. Emphasis on comparative modernization of China and Japan. (5W) **Glatfelter**

Independent Studies

391. (239) Readings and Conferences. Credit arranged. (F, W, Sp) **Staff**

United States

432. (141) Colonial America. The colonial period of American history from the European background to 1763. (3F) **Nicholls**

434. (142) The New Nation. The course of American history from the beginning of the American Revolution to the 1820's. (3W) **Nicholls**

436. (143) The Jacksonian Era. Political, economic, and cultural developments from the 1820's to 1850, emphasizing the development of political parties and the character of Jacksonian democracy. (2Sp) **Nichols**

438. (144) The Civil War and Reconstruction. (3W) **Cazier**

442. (145) Development of Modern America (1877-1916). The transformation of the United States from a rural society to an industrial and urban nation. Emphasis on economic change, political parties and the populist and progressive reform movements. (3F) **Ahlstrom**

446. (147) Recent America (1945 - present). Domestic and foreign policy since World War II. Emphasis on the cold war and the political and social developments of contemporary United States. (3Sp) **Ahlstrom**

449. (174) History of Black America. The role of the black man in American history, life, and culture. From the background of early African civilizations, through slavery to freedom, and the difficult quest for democracy and equality. (3Sp) **Ahlstrom, Cazier, Lye, Pratt**

Latin America

471. (181) Latin America to 1830. Geography, pre-Columbian peoples; exploration, conquest, and colonization by European powers; political, social, and economic developments; international rivalries and ineffective mercantilism; prominent revolutionists, and the independence wars. (3F) **Pratt**

472. (182) Latin America Since 1830. The new nations emerging from the independence wars; social, economic and political development of the twenty Latin American nations in the 19th and 20th centuries. (3W) **Pratt**

Canada

481. (169) History of Canada. From earliest times to the present. (3W) **Lye, Yonce**

Advanced Upper Division Theme and Topic Courses

Europe

501. (166) Ideas in Early European History. From Plato to Voltaire, studied against a background of contemporary economic, social and political developments. (3) **Cole**

502. (167) Ideas in Modern European History. The historical impact in the 19th and 20th centuries of romantic, scientific and futuristic ideas. (3) **Cole**

505. (114) History of Science: Ancient and Medieval. From antiquity through Copernicus. (3) **Staff**

506. (115) History of Science: Modern. Since Galileo. (3) **Staff**

509. (170) A Study of War and Peace. A study of the causes of war and the conditions for peace, considered in the historical context of various civilizations at various periods of time, selected with the view to an understanding of the complexity of the problem and the conditions necessary for a possible solution. See Catalog section on the Center for the Study of the Causes of War and the Conditions for Peace. (3) **Staff**

511. (165) Expansion of Europe. Conquest and exploitation of the world by western Europeans between 1400 A.D. and the present, emphasizing the methods, motives and results of this European domination in various parts of the world; the acculturation and resurgence against foreigners; the decline of Western power. (5Sp) **Pratt**

517. (161) The Growth of England to 1714. English social and political development from the earliest times. (3F) **Cole**

518. (162) The Modernization of English Society. Development of social, economic, political and intellectual institutions since 1714. (3W) **Cole**

519. (163) The British Empire. Rise and decline of the British Empire in the modern world. (3) **Lye**

521. (121) Germany Since the Reformation. Historical development of Germany since the Reformation to the present; backgrounds of

"the German problem," Germany under Bismarck, World War I, Germany under Hitler, post-war Germany. (5Sp) **Alder**

525. (138) Muscovite and Imperial Russia. Political, economic and cultural development of the Russian people from the emergence of the Muscovite state to the revolutions of 1917. (3F) **Glatfelter**

526. (139) The Russian Revolutions and Soviet Regime. Historical development of the Russian revolutionary movement of the 19th century and its culmination in the revolutions of 1917. The second half of the course will cover the economic, political, social and cultural development of the Soviet state from its founding to the present day. (3W) **Glatfelter**

United States

535. (135) The Frontier in American History. The patterns of westward expansion in North America, with emphasis on the institutions and methods of penetration, conquest, exploitation, and settlement of the frontier. (5F) **Yonce**

537. (137) History of Utah. Geography and native peoples, early explorations, political, social, and economic developments to the present. (5Sp) **Ellsworth**

541. (155) Cultural History of the United States. A social and intellectual history of the United States with emphasis on the development of major thought patterns in relation to their social-economic context. (5) **Cazier**

543. (150) Comparative American Religions. A historical, comparative study of religions and major churches in America. The development of the major faiths and churches in America, their role in American life and shaping the American tradition; church and state relations in America. (3) **Staff**

545. (171) Constitutional History of the United States. (5) **Staff**

547. (173) Immigrants in America. The background push, the voyage, initial reception and eventual acculturation. The cultural impact of immigration from Europe, Asia, and the western hemisphere. (3Sp) **Pratt**

Africa

553. (153) History of Southern Africa. The political, social and economic history of Africa south of the Zambezi River, stressing the interaction of Negro, Khoisan and European cultures. (3Sp) **Lye**

Asia

567. (177) History of China. Development of traditional Chinese culture and the effect on that culture of the growth of Western influence. (3) **Glatfelter**

568. (178) History of Japan. The development of Japan with a special emphasis on the modern transformation in the last century. (3) **Glatfelter**

569. (179) Civilization of India. The development of Indian civilization and major currents in her history from earliest times to the present. (3) **Lye**

Latin America

573. (183) Contemporary Latin America. Present affairs and problems of each Latin American nation, providing insight with social, economic and the extraordinary political realms, as viewed from various internal and external levels. (3Sp) **Pratt**

574. (184) History of Mexico. The social, economic, and political history from colonial times to the present, with major emphasis on the national era. (3W) **Pratt**

575. (185) History of United States - Latin American Relations. The diplomatic, economic and cultural relations between the United States and the twenty Latin American nations. (3) **Pratt**

576. (186) Economic History of Latin America. The economy as it developed in colonial days, the economic problems of the new nations in the 19th century, the push to industrialize as well as maintain raw material production in the 20th century, the need for capital investment, and government and international efforts to provide this. (3) **Pratt**

Senior Professional Courses

585. (192) Historical Synthesis. Attempts a narrative and topical synthesis of selected great periods and themes in history. Recommended for the Senior year. (2) **Ellsworth**

586. (193) Introduction to Historical Research. Directed research in primary source materials to illustrate the steps in historical research. Recommended for the Senior year. (3F, W, Sp) **Staff**

589. (195) Special Studies. An examination of special areas and themes in history. (3F, W, Sp) **Staff**

Graduate

603. (203) Historiography. The history of historical writing. (3) **Cole**

605. (205) Philosophy of History. Interpretations, causation, and interrelations in History. (3F) **Cazier**

610. (295) Colloquium in Special Studies. Intensive readings and discussions in special themes or areas. (3F, W, Sp) **Staff**

620. (223) Colloquium in European History. Intensive readings and group discussions of literature on selected themes in European history. (3W) **Alder, Cole, Glatfelter**

621. (271) Colloquium on War and Peace. Intensive reading and discussion of the literature relating to man's attempts to find a means for insuring the peaceful ordering of human affairs. (3) **Staff**

630. (225) Colloquium in American History. Intensive readings and group discussions of literature on selected themes in American history. (3F, W, Sp) **Ahlstrom, Cazier, Nicholls, Yonce**

635. (235) Colloquium in Western American History. Intensive readings and group discussions of literature on selected themes in American frontier history. (3W) **Yonce**

637. (501) Teaching Utah History. Seminar in the sources and literature of Utah history, exercises in the preparation and presentation of materials. (3) **Ellsworth**

650. (231) Colloquium in African History. Intensive readings and group discussions of literature on selected themes in African history. (3Sp) **Lye**

670. (229) Colloquium in Latin American History. Intensive reading and group discussions of literature on selected themes in Latin American history. (3F) **Pratt**

680. (201) Historical Method. A study of the historical method and its relations to the other social sciences. History 300 and 586 recommended but not required prerequisites. Recommended to graduate students in other fields making use of the historical method in their research. (3F, W, Sp) **Staff**

681. (222) Seminar in European History. Research in primary source materials for the study of special phases of European history. (3Sp) **Alder, Cole, Glatfelter**

682. (224) Seminar in American History. Research in primary source materials for the study of special phases of American history. (3W) **Ahlmstrom, Cazier, Yonce**

683. (207) Seminar in American Colonial History. An introduction to the historical literature of early America and research in the primary materials. (3Sp) **Nicholls**

684. (226) Seminar in Western American History. Research in primary source materials for the study of special phases of Western American history. (3Sp) **Yonce**

685. (230) Seminar in African History. Research in primary source materials for the study of selected subjects in African history. (3) **Lye**

687. (228) Seminar in Latin American History. Research in primary source materials for the study of special phases of Latin American history. (3) **Pratt**

691. (239) Readings and Conferences in Special Areas. Credit arranged. (F, W, Sp)

695. (259) The Teaching of History. Limited to graduate assistants. (1F, W, Sp) **Staff**

697. (298) Thesis Research. Credit arranged. (F, W, Sp) **Staff**

698. (new) Research Consultation. (F, W, Sp) **Staff**

699. (400) Continuing Registration. (F, W, Sp) **Staff**

Geography

The undergraduate program in Geography emphasizes a broad background in the systematic and regional fields of geography. **A major in Geography** consists of 45 credits with a grade point average of at least 2.5. Every Geography major is required to complete the introductory sequence of 16 credits: Geography 101 Fundamentals, Geography 103 Cultural, Geography 113 Physical, and Geography 123 Economic. In addition, Geography 588 Geographic Methods, is required of all majors during their Junior or Senior year. The remaining 26 credits are elective with at least six credits from the systematic courses and six credits from the regional courses.

In order to strengthen their background, students are encouraged to take courses offered in other departments. For students interested in Physical Geography it is recommended that courses in Geology, Meteorology and other relevant disciplines be taken. Those interested in Cultural Geography are encouraged to take courses in History, Anthropology, Political Science and Sociology de-

pending upon the student's interests and upon consultation with the adviser. A student is encouraged to select a minor (minimum 18 credits) in a field closely related to Geography.

A minor in Geography consists of 24 credits. Geography 101, 103, 113, and 123 are recommended and the remaining eight credits should be taken from both the systematic and regional courses.

Teaching Major in Geography consists of 40 credits with 16 credits taken from the introductory sequence Geography 101, 103, 113 and 123. It is also required that teaching majors take Geography 580, Teaching of Geography, prior to student teaching. The remaining credits are elective and should be taken from the systematic and regional fields.

Teaching Minor in Geography consists of 25 credits. Thirteen credits are to be elected from the introductory courses: Geography 101, 103, 113, 123, and 580, Teaching of Geography. The remaining credits are elective with six credits elected from the regional courses and three credits from the systematic courses.

Geography Courses

Introductory

101. (90) Fundamentals of Geography. A general introduction to the study of geography as a science, its scope, aims, and purpose. Basic concepts in the various systematic fields of geography will be discussed. (3F, W, Sp) **Thom**

103. (30) Cultural Geography. A survey of world culture regions with an analysis of political, economic and resource patterns in their physical setting. (5F, W, Sp) **Peterson**

113. (33) Physical Geography. Geographic analysis of the distribution and processes concerned with elements of the natural environment, i.e., weather, climate, landforms, vegetation, soils, and water. (5F, W, Sp) **Demars**

123. (31) Economic Geography. Geographic analysis of world patterns of economic activities, i.e., production, consumption, and exchange, with emphasis on factors of industrial location. (3F, W) **Craig**

Regional

302. (126) Geography of Africa. A regional survey of the physical and cultural geography of Subsaharan Africa. Special attention is drawn to the relationship between man and his environment and to the recent changes in economic and political structures. (3F, Sp) **Thom**

307. (127) Geography of Anglo-America. A comprehensive and systematic survey of the population, natural resources, potentials and geographic regions of the United States and Canada, and their implications in the economic and political affairs of the world. (3Sp) **Craig, Demars, Peterson**

308. (121) Geography of Utah. Course is designed to acquaint the student with the physical and cultural geography of Utah. Particularly emphasized will be the ways in which cultural adjustments have been made to conditions such as aridity, proximity to California and other states, the urban sprawl and the recent popularity of outdoor recreation. (3Sp) **Demars**

314. (124) Geography of Asia. A geographic analysis of physical and human resources of Asia. Contemporary political, economic and social problems are evaluated in their regional context. (3W) **Peterson**

325. (125) Geography of Europe. The influence of geography on domestic and international problems, cultural, ethnic and linguistic backgrounds, boundaries, population trends, economic and governmental systems. (3F, Sp) **Craig, Peterson**

328. (129) Geography of Latin America. An analysis of the physical and socio-economic characteristics of Latin America from the geographic point of view. The spatial patterns of human and environmental phenomena are discussed with emphasis on cultural, historical and political geography of Latin America. (3F) **Thom**

330. (130) Geography of Developing Lands. A geographic analysis of developing and emergent countries in terms of internal and external problems and interrelationships. (3W) **Thom**

Systematic

340. (191) Geography of World Affairs. An analysis of current areas of the world in which racial, economic, political or religious

tensions appear. The location aspects of the areas, spatial relationship, historic, social and linguistic patterns are studied. (2F, W, Sp) **Peterson**

343. (140) Political Geography. An examination of the mutual relationship between earth and state. The world's political phenomena studied from a geographic point of view will be introduced, including such topics as international boundaries, territorial seas, and landlocked states. (3F) **Thom**

351. (150) Geography of Population and Settlement. A survey of the impact of technology and population growth on natural resources. Attention is drawn to the distribution of population and settlement in relation to the features of the natural environment. (3W) **Thom**

357. (160) Historical Geography of the United States. An examination of the processes, events, and philosophies that have shaped the geography of modern United States. The geography of specific regions through different points in time will be emphasized to lend insight into present regional differences and problems. Also emphasized will be the different philosophies toward environment and its utilization that have characterized American growth and development. (3W) **Demars**

361. (180) Urban Geography. Origin and growth of cities. Structure and function of urban centers, their areal expansion and inter-trade center relations. Theory of the urban setting as related to the rural. (3Sp) **Craig**

Methods and Techniques

580. (100) Teaching of Geography. Designed to assist the classroom teacher in the presentation of geographic information. Techniques, methods, and sources of data will be stressed. (3F, W, Sp) **Craig**

588. (new) Geographic Methods. Designed to acquaint the geography student with basic skills, techniques, and resources utilized in geographic research. Personal and group projects requiring this methodology will be required in conjunction with the solving of field study problems in the Cache Valley area. (3Sp) **Demars**

599. (199) Readings and Conferences. Credit arranged. (F, W, Sp)

**Department of*

Home Economics Education

Head: Assistant Professor Marie Krueger
Office in Family Life 318

Degrees: Bachelor of Science (BS), Master of Science (MS)

Major: Home Economics Education Composite for Secondary School Teaching

Home Economics Education provides professional training for teaching homemaking in the secondary schools, for Extension Services, or as a home economist with a utility company, or with welfare departments.

Undergraduate Study

Composite Major for Secondary School Teaching. The composite major requirements in subject matter courses are distributed as follows:

CT	110	Pattern Designing and Clothing Construction	3
CT	124	Introduction to Textiles	3
CT	275	Home Furnishings	3
CT	306	Behavioral Science Aspects of Clothing	2
CT	320	Comparative Construction Techniques	5
FCD	150	Early Childhood	5
FCD	350	Play-School Education	5
FCD	320	Marriage	3
		Plus three FCD credits elective	3
[1]FN	123	Principles of Nutrition	3

*In College of Family Life.

[1]FN	122	Principles of Food Preparation	3
FN	225	Meal Management for Families	3
FN	407	Science in Food Preparation	3
FN	408	Science in Food Preparation	3
FN	440	Nutrition	4
HEM	265	Housing	3
HEM	300	Household Equipment	3
HEM	349	Home Management	3
HEM	350	Home Management House	4
HEM	355	Family Finance	3
HEM	375	Consumer Education	3
PubH	452	Family Health	3

Some depth in the major is provided by requiring six additional credits which may be distributed by the student's option.

Professional Education Courses

Courses	Credits
FCD 210 or Psych 110	3
Psych 366	3
Public Health 455	3
Sec Ed 301 Foundation Studies in Teaching	5
HEcEd 420	3
HEcEd 450	3
HEcEd 460	12

In filling University group requirements, students should keep in mind Home Economics Education prerequisites.

Courses	Credits
Chem 111, 112 General Chemistry	10
Chem 141 Elementary Organic Chemistry	5
Physiol 130 Human Physiology	5
Psych 101 Elementary General Psychology	5

It is recommended that a subject interest be developed into a teaching minor: e.g. English, Business, Music, Physical Education, Social Science, Chemistry, Journalism and so on.

An "application for admission to teacher education" should be completed before the Junior year (see College of Education for requirements). Approval is a prerequisite to teacher certification candidacy and to enrollment in Education and Psychology courses.

A grade point average of 2.5 is required in both the major work and in the professional education classes as a prerequisite to student teaching.

State Certification. Students who have a BS degree in general Family Life and are interested in professional training to teach Vocational Homemaking classes at the secondary level, must meet certification requirements at the certifying institution.

Services available to teachers are:

1) Guidance and help in meeting requirements for: a) renewing certificates and b) meeting certification requirements.

2) Advanced study leading to the Master of Science degree in Home Economics Education.

3) In-service education.

Graduate Study

The department offers four programs for graduate study:

Plan I. This program is designed especially for those who wish to supervise the student teaching experience or take other Home Economics supervisory positions. The basic plan requires 45 credits. Research and thesis or Plan B reports may be conducted during the school year in on-going classroom situations. Evidence of a minimum of two years of successful teaching on the secondary level must be presented before the degree is granted.

Plan II. This program is designed for either the recent graduate in Home Economics or for the experienced teacher. Emphasis is given to acquiring some depth in subject matter, curriculum development, and instructional techniques.

Plan III. This program is flexible to meet individual needs and is particularly applicable for ex-

[1]May be exempt by examination.

tension home economists who need community development emphasis, as well as subject matter strength. The basic program requires 45 credits. Included is research and thesis or Plan B reports.

Plan IV. The department will supervise a 55-credit planned program for professional certification which requires a minimum of 12 credits in Professional Education (may include Educational Psychology), and 12 credits in subject matter. This program culminates in a professional certificate. The professional certificate requires evidence of no less than three years successful teaching experience, and is issued on recommendation of the department to the state certification agency.

See the Graduate Catalog for a more detailed accounting of the four plans.

Home Economics Education Courses

Undergraduate

397. Honors Studies. See Family Life 197. Credit arranged. (F, W, Sp, Su) **Staff**

440. (120) Methods in Teaching Homemaking. Curriculum planning with appropriate use of textbooks, audio-visual materials, home experience and practices, and evaluative materials. Development of a philosophy of home economics education in keeping with changing conditions affecting family living. Prerequisite: Psychology 106 (or take concurrently). (3F, W, Sp) **Krueger**

450. (121) Home Economics Curriculum Seminar. Take with HEcEd 460. Register with the instructor of HEcEd 450 and 460 one quarter prior to student teaching (3F, W, Sp) **Staff**

460. (120) Student Teaching in Home Economics Education. Prerequisites: HEcEd 420, 450 (12F, W, Sp) **Staff**

490. (190) Independent Study. Credit arranged. (F, W, Sp, Su) **Staff**

Graduate

560. (new) Internship. (7F, W, Sp, Su) **Staff**

590. (290) Independent Study. Credit arranged. (F, W, Sp, Su) **Staff**

617. (217) Current Developments in Home Economics Education. Offered as needed. (3) **Staff**

637. (237) Seminar. Opportunity for investigations and reporting on individual problems. Credit arranged. (F, W, Sp, Su) **Staff**

697. (295) Research for Master's Thesis. Credit arranged. (F, W, Sp, Su) **Staff**

699. (400) Continuing Graduate Advisement. Credit arranged. (F, W, Sp, Su) **Staff**

*Department of

Household Economics and Management

Head: Associate Professor Edith Nyman
Office in Family Life 314

Associate Professor Helen Thackery
Instructors LaRae Chatelain, Jane Lott
Degrees: Bachelor of Science (BS), Master of Science (MS)
Majors: Household Economics and Management

Courses in this department help students to understand the theory of management and decision making in terms of personal values and goals. Theory is applied to specific aspects of management in the home: housing, family finance, and selection of household equipment. Course content gives meaning to the relationship between general economic conditions and economic problems of families.

The department uses two laboratories — one is a modern Equipment Laboratory, the other is the Home Management Laboratory.

Undergraduate Study

Household Economics and Management Major. Two areas of emphasis are possible within the major: Management and Finance, Housing and Equipment.

Core Requirements for All Majors

Courses			Credits
HEM	265	Housing	3
HEM	300	Equipment	3
HEM	349	Home Management	3
HEM	350	Home Management House	4
	or		
HEM	351	Home Management Problems	4
HEM	355	Family Finance	3
HEM	375	Consumer Education	3

*In College of Family Life.

Management and Finance Option. This emphasis provides preparation leading to positions in family financial counseling, welfare services, and extension services.

In addition to the core an additional 26 credits are to be selected from the following courses in consultation with the adviser.

BA	151	Salesmanship	2
BA	550	Fundamentals of Marketing	5
BA	458	Advertising	4
BA	451	Consumer Behavior	3
Econ	201	Economic Problems	5
Psych	348	Motivation	3
Psych	351	Social Psychology	3
Anthr	101	Introduction to Anthropology	3
Anthr	501	Comparative Value Systems	3
Anthr	502	Comparative Family Systems	3
Soc	330	Social Change	3
SW	105	Introduction to Social Work	3
HEM	352	Management in Home-Comm Rel	3
Phil	411	Theories of Value	3
Phil	110	Introduction to Philosophy	5
Phil	111	Ethics	4

Housing and Equipment Option. This emphasis provides preparation leading to positions in city planning and housing agencies, home building industries; kitchen planning, remodeling, home lighting and interior design firms, utility companies.

In addition to the core 26 credits are to be selected from the following courses in consultation with the adviser.

HEM	410	Advanced Equipment	3
HEM	420	Utility Company Internship	9
HEM	465	Advanced Housing	3
Art	105	Essentials in Interior Design	3
Art	305	Applied Interior Design	3
LAEP	103	Introduction to Landscape Arch	3
Physics	120	General Physics	5
Speech	105	Public Speaking	3
Psych	351	Social Psychology	3

HEM	265	Housing	3
HEM	300	Equipment	3
HEM	349	Home Management	3
HEM	355	Family Finance	3

An additional six credits are to be selected from the departmental offerings.

Graduate Study

The department offers work leading to the Master of Science degree. Flexibility in program planning provides opportunity for developing individual abilities and interests. Course work is arranged in cooperation with other departments of the University, including: Economics, Sociology, Psychology, Philosophy, Business Administration, Physics, Statistics, Chemistry, Family and Child Development, Food and Nutrition, and Clothing and Textiles. A master's degree prepares students for university teaching.

Household Economics and Management Courses

Undergraduate

265. (65) Housing. A consideration of factors involved in housing the family; renting, building or buying; location, orientation and site planning; financing, criteria for evaluating homes, housing trends; population increase. (3F, W, Sp) **Chatelain**

300. (100) Household Equipment. Kitchen and laundry. (3F, W, Sp) **Chatelain**

349. (149) Home Management. Values and goals in decision making of family resources. (3F, W, Sp) **Lott**

350. (150) Home Management House. Application of management theory in a living situation. Residence in Home Management House for five weeks. Application must be made with instructor in advance of registration. Prerequisites: Food and Nutrition 122, 123, and 225 or its equivalent: HEM 349. (4F, W, Sp) **Lott**

351. (151) Home Management Problems. Substitute for HEM 350 for married students only. The application df the theory of management as applied in student's home. Prerequisites: Food and Nutrition 122, 123, and 225 or equivalent; HEM 349. (4F) **Lott**

352. (152) Managerial Problems in Home-Community Relations. Comparison of families with respect to goals, resources available, and managerial ability. Includes home visits, case studies, game theory, and research. Prerequisite: HEM 349. (3W, Sp) **Lott**

410. (110) Advanced Equipment. Performance testing of major appliances and small pieces of equipment. (3Sp) **Chatelain**

420. (120) Utility Company Internship. Practical experience with a utility company under the direction of a supervisor from the utility company and the University. Students will be employed for a 40-hour week out of the Salt Lake City office for a five-week period. May be taken with HEM 450 and/or Independent Study 490. Students must be approved by the instructor and the utility company representative before registration. Prerequisites: HEM 165, 300, 350 and Foods 225. (9F, W, Sp) **Nyman**

455. (201) Family Finance. Consideration of major financial alternatives available to families: some factors that determine financial decision. (3F, W, Sp) **Nyman**

460. (160) Seminar. Review of Literature. Credit arranged. (F, W, Sp, Su) **Staff**

465. (165) Advanced Housing. Organization and use of space, house design and remodeling for different family stages. (3W) **Chatelain**

475. Consumer Education. The role of the family and its members as consumers; current aspects of consumer behavior; agents involved, i.e. government, the market, consumer interest groups, etc. (3W, Sp) **Nyman**

490. (190) Independent Study. Credit arranged. (F, W, Sp, Su) **Staff**

497. (197) Honors Studies. See Family Life 197. Credit arranged. (F, W, Sp, Su) **Staff**

Graduate

649. (249) History and Philosophy of Home Management. (3W) **Lott**

660. (260) Seminar. Review of current literature. Credit arranged. (F, W, Sp, Su) **Staff**

680. (293) Research Methods. See Family Life 680. (3F) **Schvaneveldt**

697. (295) Research for Master's Thesis. Credit arranged. (F, W, Sp, Su) **Staff**

699. (400) Continuing Advisement. Credit aranged. (F, W, Sp, Su) **Staff**

*Department of

Industrial and Technical Education

Head: Professor Neill C. Slack

Office in Industrial Science 112

Professors Austin G. Loveless, William E. Mortimer

Associate Professors Edward L. France, Charles W. Hailes, Lowell P. Summers, John F. Van Derslice, Carl R. Wallis, Lynn R. Willey

Assistant Professors Jay C. Hicken, Ralph E. Long, Samuel W. Merrill, Loren L. Palmer, J. LaMar Wright

Instructors Leon M. Hill, Charles B. Larsen

Lecturers Derral M. Child, David L. Neel, Harold M. Wadsworth

Degrees: Two-Year Certificate of Completion in Technical Education, Bachelor of Science (BS), Master of Science (MS), Master of Industrial Education (MIE), Doctor of Education (EdD)

Majors: Industrial Arts Teacher Education, Technical Teacher Education, Vocational (Trade and) Industrial Teacher Education, Aeronautical Technology, Automotive and Diesel Technology, Welding Technology

American industry has expanded at a rate which defies description in the past two decades. This expansion has created a dynamic, fast-changing society and economy with unlimited opportunities. The need for well-educated industrial and technical personnel has always been great, but has now become essential to our national economic and social well-being.

The Industrial and Technical Education Department offers a series of programs designed to provide training for professions in a wide spectrum of the industrial and technological world. Qualified and experienced staff members have been assembled to develop and incorporate new ideas from their fields into this progressive area.

Facilities for the programs include 67,000 square feet of floor space in four buildings containing laboratories with equipment specifically designed for instruction in welding, electricity-electronics, automotive - diesel, aeronautics, woods, metals, plastics, graphic arts and drafting. The first phase of a $2,340,000 building has recently been completed. This provides 28,000 feet for offices, classrooms, test facility, metals, multipurpose and welding laboratories.

The department has two major divisions, each responsible for a specific area of instructional activity. The Industrial Teacher Education division has as its main objective the preparation of teachers and administrators for industrially related activities in education and when applicable in industry. The Industrial Technology division is generally responsible for training technical personnel to serve as technicians and super-

*In College of Engineering.

visors for the "hands on" or activity phase of industry.

Graduates of the various programs are in great demand and are employed in top-level positions both in education and industry. To continue meeting the growing demands for graduates the department offers a variety of programs in both divisions. As an aid to help the student better understand the various programs they are listed as follows.

There are two Bachelor of Science degree programs, each with a choice of three majors and one minor. There is also a Two-Year Certificate program, with a choice of four specializations:

A) BS program in Industrial Teacher Education, with a choice of:

1) Major in Industrial Arts Teacher Education
2) Major in Technical Teacher Education
3) Major in Vocational (Trade and) Industrial Teacher Education
4) Minor in Driver Education

B) BS program in Industrial Technology, with a choice of:

1) Major in Aeronautical Technology
2) Major in Automotive and Diesel Technology
3) Major in Welding Technology

C) Two-Year Certificate program in Technical Education, with a choice of four specializations:

1) Aeronautics
2) Automotive
3) Drafting
4) Welding

For convenience, the curricula and courses for the various majors are shown under the particular division in which they are taught and administered.

Industrial Teacher Education Division

Head: Professor Neill C. Slack
Office in Industrial Science 112

Professors Austin G. Loveless, William E. Mortimer

Associate Professors Edward L. France, Charles W. Hailes, John F. Van Derslice, Carl R. Wallis

Assistant Professors Jay C. Hicken, Loren L. Palmer

Lecturer Harold M. Wadsworth

Undergraduate Study

The increased emphasis on preparing youth for the industrial society and the world of work and for the upgrading and retraining of workers to meet modern industrial processes has placed new importance upon the need for trained teachers of Industrial Arts Education, Industrial Vocational Education, and Technical Education. The demand is great for the trained teacher in both the public school system and in industry.

The Industrial Teacher Education program offers professional courses through the school year, and Summer Quarter, both on and off campus. Completion of the

curriculum leads to the Bachelor of Science degree in Industrial Teacher Education, with majors in Industrial Arts Education, Vocational Industrial Education, and Technical Education.

Industrial Arts Teacher Education Major prepares one to teach in junior and senior high school positions. The curriculum is designed to encompass eight technical areas which meet State Certification requirements.

An "application for admission to teacher education" should ordinarily be completed before the Junior year (see College of Education for requirements). Approval is a prerequisite to teacher certification candidacy and to enrollment in courses in Education.

Courses emphasize laboratory skills and technical knowledge included in basic American industries. The curriculum also includes courses in the arts, sciences, education, and professional industrial education. The Industrial Teacher Education curriculum with a major in Industrial Arts Teacher Education is as follows:

Industrial Arts Teacher Education Major

FRESHMAN YEAR

Courses	Credits
Technical Sequence (Wood) 170, 171	6
English 101, 102, 103	9
Math 101, 106	6
Technical Sequence (Drafting) 120, 121	6
Humanities or Social and Behavioral Science	3
Humanities	9
ITE 100, 110	4
PE	3
Total	46

SOPHOMORE YEAR

Natural Science (Chem 111 and Physics 120)	10
Biological Science	5
Technical Sequence (Metal) 160, 150, 151	9
Social and Behavioral Science Group (Psychology 101, Economics 200)	10
Speech	3
Technical Sequence (Electronics) 130, 131	6
Electives	6
Total	49

JUNIOR YEAR

Psychology 110	6
Public Health 455	3
Secondary Education 301	5
Advanced Technical Sequence	15
ITE 380, IT 160	6
Elective (Minor)	3
Power Mechanics	6
Graphic Arts	3
Total	47

SENIOR YEAR

ITE 440, 501, 502	7
ITE 521	3
ITE 460	9
ITE 520, 443	6
Advanced Technical Sequence	6
Electives (Minor)	15
Total	46

Trade and Industrial Teacher Education Major prepares one to teach in high school and post high school trade and industrial programs. A candidate for the degree must show evidence of two years successful occupational experience in the specific area in which he is preparing to teach. This requirement meets the occupation experience and certification outline as stated in the State Plan of the Utah Board for Vocational Education.

The Industrial Teacher Education curriculum with a major in Trade and Industrial Teacher Education is as follows:

Trade and Industrial Teacher Education Major

FRESHMAN YEAR

Courses	Credits
Trade Courses	9
English 101, 102, 103	9
Math 101, 105, 106	11
Approved Electives	6
Humanities Group	9
ITE 100	1
PE 100, 162 and elective	1
Total	48

SOPHOMORE YEAR

Trade Courses	12
Physics 111, 112, 113 or Physics 120, Chemistry 111, 112	15
Biological Science	5
Social and Behavioral Science Group Economics 200, Psychology 101)	13
Approved Electives (minor)	18
Speech	3
Elective	3
Total	69

JUNIOR YEAR

Advanced Trade Courses	17
Humanities or Social Sciences	3
Psychology 110 or 366	3
Public Health 455	3
Education 301	3
English 305	3
Approved Electives (minor)	18
Total	50

SENIOR YEAR

Advanced Trade Courses	12
ITE 501, 440, 502	7
ITE 520, 521	6
ITE 460	9
ITE 443	3
Approved Electives (minor)	9
Total	46

Technical Teacher Education Major prepares one to teach post secondary technical programs. A candidate for the degree must show evidence of successful occupational experience in the specific technical area in which he is preparing to teach. The Industrial Teaching Education curriculum with a major in Technical Teacher Education is as follows:

Technical Teacher Education Major

FRESHMAN YEAR

Courses	Credits
Technical Courses	9
English 101, 102, 103	9
Math 101, 105, 106	11
ITE 100, 121	4
Humanities Group	6
Gen Engrg 102	1
Approved Electives (minor)	6
PE, AS or MS	3
Total	49

SOPHOMORE YEAR

Technical Courses	15
Physics 211	5
Biological Science	5
Chemistry 111, 112 or Physics 212	10
Social and Behavioral Science Group (Economics 200, Psychology 101	10
Chemistry 111	5
Total	50

JUNIOR YEAR

Advanced Technical Courses	15
Speech 121	3
Psychology 366, Education 301	6
English 305, Mfg Engrg 450	6
Approved Electives (minor)	6
ITE 480, 130	6
Humanities Group	6
Total	48

SENIOR YEAR

Advanced Technical Courses	12
ITE 520	6
ITE 521, 460	6
ITE 443, 502	6
Approved Electives (minor)	15
Total	45

Driver Education Minor. The minor is designed to meet State Driver Education Certification requirements.

An approved minor consists of 24 credits. A minimum of 12 credits are required in the area of Driver and Safety Education. Also a minimum of six credits are required in related safety work. Check with department advisers for approved courses.

Graduate Study

Two types of master's degree programs are available to students doing graduate work in the Department of Industrial and Technical Education. These programs are the Master of Science degree in Industrial Education and the Master of Industrial Education degree.

The Doctor of Education degree in Industrial Education is avail-

able to those students who desire to do advanced work beyond the master's degree. This degree program is designed for professional instructors in the field of Industrial Arts, Technical, and Trade and Industrial Education. The Doctor of Education degree in Industrial Education is an interdisciplinary degree program administered jointly by the College of Education and the College of Engineering.

The degree programs are sufficiently flexible to meet the needs of individuals engaged in the various phases of Industrial Education work. Candidates are given assistance in planning a program which will provide them with technical and professional development considered essential. For additional information on the programs for these degrees, see the Graduate Catalog.

Industrial and Technical Education Courses

Undergraduate

50. (3) Building Maintenance. Materials used in maintaining modern school buildings. Required of all persons doing part-time custodial work on campus. Two lectures, lab arranged. (3F, W, Sp) **Wadsworth**

100. (1) Orientation. Various occupational opportunities in Industrial and Technical Education, including the necessary preparation for entrance into these occupations. (1F, W) **Staff**

101. (2) Applied Shop Mathematics. Simple mathematical formulas for solving problems in mechanical work, including speed ratios, steel square, micrometer reading, and area and volume problems. (3F, Sp) **Mortimer**

110. (90) Industrial Crafts. Basic craft materials, processes and applications in educational and recreational programs. (3F, Sp) **Hailes**

111. (91) Industrial Crafts-Metal. Design and production of functional metal objects as well as fundamentals of lapidary processes will be stressed. (3W, Su) **Hailes**

115. (95) Graphic Arts Technology. Letterpress printing, intaglio printing, lithography, screen process printing, binding and finishing operations. (3W) **Staff**

145. (38) Power Mechanics. Mechanical and fluid power transfer devices with emphasis on the basic principles of hydraulics and pneumatics and the application of fluid principles in the transmission of power. Designed to help Industrial Arts and Science teachers in suitable curricula development at the various levels of instruction. (3F, Su) **Wright**

146. (39) Power Mechanics. Internal combustion engines and their function, methods of converting energy, and utilization; power distribution, control, output and measurement. Opportunity is provided for planning, developing, and organizing materials and projects for use in teaching power mechanics in the secondary school system. Two lectures and one lab. (3Sp, Su) **Wright**

160. (92) Technical Plastics. Production, techniques, optimum uses, maintenance, shapes, colors, strengths, and design. (3F) **Hicken**

161. (93) Technical Plastic. Selection of materials, setting up production methods (dies and molds) of fabrication, surface finishing, and tooling. (3Sp) **Hicken**

340. (130) Teaching Driver and Safety Education. A practical application of classroom and behind-the-wheel teaching techniques in driver education. (3F, Sp, Su) **Willey**

341. (131) Driver Education and Traffic Safety. To acquaint prospective teachers and others with available instructional materials, techniques, procedures and problems related to a driver education course. (3F, Sp, Su) **Willey**

342. (132) Problems in Driver and Safety Education. For teachers, school administrators, and others responsible for directing or supervising safe driving programs in the school or community. Includes traffic and liability law, insurance, stimulants and depressants, public relations, safety research, and applied psychology. (3W, Sp, Su) **Staff**

343. (133) Driver Training Teacher Workshop. (2Su) **Staff**

Drafting Courses

120. (80) Technical Drawing. Lettering, use of instruments, geometric construction, sketching, multiview drawings, dimensioning theory and practice, sectional views, and auxiliary views. One lecture, two labs. (3F, W) **Wallis**

121. (81) Technical Drawing. Screw threads and threaded fasteners, keys, working drawings and specifications, intersections, developments, and pictorials. One lecture and two labs. (3W, Sp) **Wallis**

320. (82) Technical Drawing. View relationships, spatial visualization, and problems re-

lating to points, lines, and planes. One lecture, two labs. (3Sp) Wallis

321. (89) Aircraft Drawing. Aircraft drafting techniques, numbering systems, change methods, and technical specifications. Prerequisite: ITE 320 (3Sp) Staff

322. (182) Architectural Drafting and Specifications. Prerequisite: ITE 320 (3F) Staff

323. (183) Machine Drafting. Drafting techniques, symbols, conventions used in the representation of gears, cams, jigs, and fixtures. Prerequisite: ITE 320 (3W) Staff

324. (184) Technical Illustration. Methods of converting orthographic drawings into three-dimensional drawings. Shading, inking, and air-brush techniques are introduced. Prerequisite: ITE 320 (3Sp) Staff

325. (185) Production Drawings. Advanced techniques of production drawings; details, assembly production dimensions, tolerances, position tolerances, classes of fits, surface quality, and specifications. Prerequisite: ITE 320 (3Sp, Su) Staff

380. (83) Industrial Design. Analysis, creation, and development of functional design in terms of tools, processes, forms, and materials of industry. (3F, Sp) Wallis

Electricity-Electronics Courses

130. (71) Direct Current Electricity. Basic concepts, circuits, laws, measurements, and electrical energy sources as they relate to DC electricity. Prerequisite: Math or equivalent. (3F, W, Sp) France

131. (72) Alternating Current Electricity. Basic concepts, circuits, laws, measurements and electrical energy sources as they relate to AC electricity. Prerequisite: ITE 130, Math 106. (3W) France

139. (79) Practical Electric Wiring. Basic circuits, materials, inspection procedures, electrical codes and practices related to the installation of electrical wiring in the home and small public buildings. Practical application will be centered around the actual wiring of a mock-up home. Two lectures, one lab. (3W) France

330. (73) Vacuum Tubes and Semiconductors. Basic concepts, characteristics, parameters, specifications and applications of vacuum tubes and semiconductors. Prerequisite: ITE 131. (3Sp) France

331. (173) Electronic Circuits. Basic electronic circuits commonly found in a wide variety of electronic devices, concepts of power supplies, oscillators, amplifiers, and other basic circuits as they may relate to such devices. Prerequisite: ITE 330. (3W) France

332. (174) Electronic Circuits and Systems for Radio. Fundamentals of radio communication and of the concepts of electronic circuits and systems employed in the modern radio receiver; construction, and testing of a radio receiver; principles of radio transmission and transmitters. Prerequisite: ITE 330 (3W) France

339. (175) Industrial Electronics. Concepts of electronic devices and circuits used in industrial applications for measurement and control purposes. Prerequisite: ITE 330 (3Sp) France

Metals Courses

150. (50) General Metals. Development of the skill of general metalworking and foundry. Experience in bench metal, sheet metal, maintenance, shop safety and industrial practices of metal fabrication. (3F, W) Palmer

151. (51) Machine Shop Operations. Design, function, care, setup and operation of the basic machine shop equipment. Emphasis on the theory and skill in layout, drilling, tapping, turning, threading, shaping, tool grinding, and precision measuring. (3W, Sp) Palmer

260. (52) Jig and Fixture Construction. Designing and building of tooling for various welding processes. Laboratory work involves the designing and building of tools with emphasis on jigs and fixtures for welding. Prerequisites: ITE 161, 151, 320 (3W) Staff

350. (151) Foundry Principles and Practices. Two three-hour labs. (2F) Palmer

351. (152) Machine Tool Operations. Practice in the operations on engine lathe, milling machine, contour band saw and shaper. Emphasis on design of cutters, feeds, speeds, and holding devices as used in school shops. Prerequisite: ITE 151. (3Sp) Palmer

352. (153) Industrial Machine Tool Operations. Theory and practice involving industrial equipment, layout, machine setup, indexing, gear cutting, surface grinding, tool grindings, cutting fluids, wear rates and precision measurement. Prerequisite: ITE 151. (3W) Palmer

354. (150) Machine Tool Maintenance. Construction, operating principles and maintenance problems of machines used in the school shop. Grinding the various machine cutting tools, repair and development of various tools and equipment used in school shop. Prerequisite: ITE 151. (3F) Palmer

Woods Courses

70. (69) Woodwork for Everyone. Open to anyone having a desire to work with wood. Fundamentals of woodwork and training in the use of both hand tools and woodworking

machines. Projects are selected and built by students. Furniture repair and basic principles of wood finishing and refinishing. (2-5F, W, Sp) **Staff**

170. (61) Technical Woods. Types of woods, finishes, abrasives and adhesives of the woods industry and practice in the fundamental handtool processes and limited machine experience. (3F) **Hicken**

171. (62) Technical Woods. Operation of basic machine woodworking equipment with study of their uses and nomenclature. (3W) **Hicken**

173. (64) Upholstering. Modern upholstering processes as applied to furniture and automobiles. Students upholster their own units as they learn. (3W) **Staff**

370. (160) Cabinet Making and Furniture Construction. Construction design and opportunity application of original designs. Practical work in the construction of fine furniture and built-in cabinet work. Prerequisite: ITE 374 (3F) **Hicken**

371. (162) Industrial Woods. Development, construction and uses of woodworking projects designed for high school teaching purposes. Development of jigs and fixtures for use in mass production techniques in high school shops. Prerequisite: ITE 374. (3W) **Hicken**

372. (163) Dwelling Construction and Estimating. Building codes, specifications and regulations for construction as applied to the making of a scale model structural home. Layout, strength of materials and procedure. Prerequisite: ITE 374. (3Sp) **Hicken**

373. (164) Wood Finishing. Opaque and transparent finishes for woods as applied by brush, spray or wipe on methods. Types of finishes, stains and methods of polishing as well as applicaton. Prerequisite: ITE 170. (3W) **Staff**

374. (63) Technical Woods. Continued practice with woodworking machinery and attachments with emphasis on jigs, fixtures, care and maintenance. (3Sp) **Hicken**

503. (168) Industrial Arts for Elementary Schools. Two lectures, one lab. (3W) **Staff**

504. (169) Production Techniques for Industrial Education. Analysis of industrial organizations and production techniques as they relate to a cross section of materials, processes and services. (3F, W, Sp, Su) **Staff**

Professional Courses

440. (101) Junior Practicum. Serves as a preliminary to the regular student teaching in Industrial Education. Students are assigned to various schools within the area to observe teaching in Industrial Education. (1W) **Staff**

443. (195) Methods in Industrial Education. Latest techniques of teaching as applied to individual and group instruction in Industrial Education. Students have opportunity to use these different methods in presenting lessons before the class. (3W) **Staff**

450. (new) Secondary Curriculum Seminar. Focus is placed upon the problems arising during student teaching. Includes discussion on teaching plans for adaptive classroom procedures, adaptive classroom practices to individual differences, testing, and evaluation. To be taken concurrently with Secondary Education 460 (see Sec Ed 450). Prerequisite: Admission to Teacher Education. (3F) **Staff**

460. (194) Student Teaching in Secondary Schools. Candidates are assigned to a cooperating teacher in a public secondary school for student teaching in their major and/or minor subjects. Students will have guided experiences in all professional responsibilities associated with secondary school teaching (see Secondary Education 460). Prerequisite: Admission to Teacher Education, Psychology 110 and 336, Secondary Education 306 and special methods in major and/or minor subjects. (12W) **Staff**

432. (189) Aerospace Education. General education for living in the aerospace age, including knowledges, skills, and attitudes of aerospace activities and the impact of aerospace on society. (3F, W, Sp) **Hailes**

500. (100) Principles and Objectives of Industrial Education. (3Sp) **Staff**

501. (104) Occupational Analysis. Students complete an analysis of one unit for a trade or occupation. (3F, Su) **Staff**

520. (102) Instructional Aids. Purpose, types, sources, preparation and proper use of instructional aids, including samples, models, charts, graphs, slides, still film, movie film, sound film and other aids suitable for classroom and laboratory use. (3W) **Staff**

521. (193) Shop Organization and Management. Teaches students to organize and manage an Industrial Education shop of the unit, general, or multiple activity type. Students prepare for one type of shop a complete plan of organization and management dealing with the necessary equipment, materials, supplies, methods of purchasing, financial control and problems of shop arrangement. (3Sp, Su) **Staff**

590. (190) Special Industrial Education Workshop. Allows for conducting special workshops, as needed, especially for the in-service training of Industrial Education teachers, supervisors, and administrators. May be repeated as needed providing the workshops are different, but if the credit is to be used toward a baccalaureate or master's degree, limitations will be placed by the department or a stu-

dent's graduate committee. Credit arranged. (F, W, Sp, Su)

591. (198) Special Problems in Industrial Education. Credit arranged. (F, W, Sp, Su) **Staff**

592. (199) Related Technical Training in Vocational Education. A course provided for students enrolling in industry and factory schools conducted on the university level, wherein instructors, course content, and facilities have been approved by a committee functioning through the Industrial and Technical Education Department. This course may be repeated for a maximum of nine credits to be acquired at a rate not to exceed one-and-a-half credits per 40-clock-hour week. Students should not expect to acquire more than three credits in this course in any one calendar year except where teacher training courses are of longer duration. Regular University fees must be paid and registration procedures followed. Credit arranged. **Staff**

Graduate Courses

505. (205) Trade, Industrial, and Technical Workshop. Provides opportunity for professional improvement and upgrading of trade, industrial, and technical teachers. Dissemination of current technical and professional material that the instructors must be aware of to maintain their position in the teaching of industrial subjects. Credit arranged. (Su) **Staff**

506. (206) Vocational and Technical Administration Workshop. Provides professional improvement course for administrators and supervisors of vocational and technical programs. Credit arranged. (Su) **Staff**

507. (232) Aerospace Education Workshop. For elementary and secondary teachers, to include the new areas of technical, scientific, and social knowledge related to aerospace for application in industry, science, medicine, education and other related fields. Nationally prominent speakers will be used as resource personnel. Credit arranged. (Su) **Hailes**

607. (207) Philosophy of Vocational Education and Practical Arts. (3F, Su) **Mortimer**

609. (209) Curriculum Development in Industrial Education. Actual construction of a comprehensive course of study for one of the phases of industrial education. Prerequisite: ITE 501. Three Lectures. (3W, Su) **Loveless**

610. (210) Trends in Industrial Education. Evaluation of educational and industrial thoughts; sources for materials to meet present-day trends. (3Su) **Staff**

624. (224) History of Industrial Education. (3W, Su) **Slack**

640. (240) Cooperative Industrial Programs. For potential coordinators of part-time cooperative industrial and technical classes. Essential information for conducting federally and non-federally reimbursed work-experience industrial classes in secondary and post high schools. (Su) **Van Derslice**

645. (245) Organization of Industrial Education Programs. Laws, regulations, and policies affecting industrial and technical education programs; organization of industrial and technical programs at the secondary and post high vocational and technical institute level; local, state, and federal relationships. (3Sp, Su) **Staff**

651. (251) Administration and Supervision of Industrial Education. (3W, Su) **Staff**

654. (254) Measurement in Industrial Education. Construction and use of the various types of tests and rating scales used in Industrial Education. Emphasizes measurable factors in industrial education and the types of tests best suited to this field. Elements of statistical methods necessary for intelligent use of the tests. Prerequisite: Psychology 380 (3Sp, Su) **Mortimer**

661. (261) Problems of Adult Education. Development of adult education movements; learning abilities, educational interests, needs of adults, organization of evening school programs, apprenticeship training, and related instruction for trade programs. (3Sp, Su) **Slack**

675. (275) Research in Industrial and Technical Education. To provide teachers, supervisors and directors of industrial and technical programs with research methods and techniques which are applicable to their programs. Includes interpretation of various kinds of research. (3F, Su) **Loveless**

680. (270) Seminar in Industrial Education. Gives opportunity for investigation and reporting of individual problems. (1F, W, Sp) **Staff**

690. (267) Readings and Conferences. Provides for study in advanced and specialized problems in Industrial Education. Problems are selected with approval of department adviser; investigation is carried on under direction of the major professor. Credit arranged. (F, W, Sp, Su) **Staff**

691. (200) Industrial Education Experimental Lab. Designed to give selected Senior students and graduate students in Industrial Education opportunity for experimental work with new tools, equipment, materials and processes for improved program development and teaching techniques. May be repeated up to a total of six credits. Credit arranged. (F, W, Sp, Su) **Staff**

692. (355) Internship in Industrial and Technical Programs. Designed for the advanced student working toward the Doctor of Education degree in Industrial Education. Student works under the direct guidance of an administrator or supervisor in the public schools. Credit arranged. (F, W, Sp, Su) **Staff**

693. (365) Advanced Independent Study in Industrial Education. Credit arranged. (F, W, Sp, Su) **Staff**

697. (271) Thesis Research. MS. Credit arranged. (F, W, Sp, Su) **Staff**

698. (new) Research Consultation. MS. Credit arranged. (F, W, Sp, Su) **Staff**

699. (400) Continuing Registration. MS. (3F, W, Sp, Su) **Staff**

797. (371) Dissertation Research. EdD. Credit arranged. (F, W, Sp, Su) **Staff**

798. (new) Research Consultation. MS. Credit arranged. (F, W, Sp, Su) **Staff**

799. (new) Continuing Registration. EdD (3F, W, Sp, Su) **Staff**

Industrial Technology Division

Acting Head: Associate Professor Edward L. France
Office in Technology 106

Associate Professors Lowell P. Summers, Lynn R. Willey

Assistant Professors Ralph E. Long, Samuel W. Merrill, J. LaMar Wright

Instructors Leon Hill, Charles B. Larsen

Lecturers Derral M. Child, David L. Neel

Four-Year Degree Program. Modern technology has created many challenging careers that can be undertaken by the graduates of four-year programs in Aeronautics, in Automotive and Diesel, and in Welding Technology. A bachelor's degree in any of these three programs can lead to high-level industrial technologists and supervisory or managerial positions in industry. Excellent foundation is provided for entrance into civil service positions, business, and industry. One of the fastest growing needs in industry is for the technologist. Graduates of these programs are in great demand now and will be in the foreseeable future.

Two-Year Technical Program.

Programs in Technical Education provide university training of a non-degree nature. They are designed to prepare persons to enter into modern industry as technicians.

The completion of the two-year Technical Education curriculum leads to a Certificate of Completion in one of the following areas of specialization: Aeronautics, Automotive, Drafting, and Welding. Qualified students may apply most of the credits earned under this program toward a degree at a later date.

Students interested in this program should work directly with an adviser in the department to determine specialization courses.

Aeronautics Major. This major prepares the student to enter the aerospace industry as a high-level technician and to assume responsible supervisory and administrative positions in maintenance management, transportation research, and design, with opportunities in the missile industry. The Aero-

nautics Technology curriculum is fully certified and meets Federal Aviation Agency regulations.

Students desiring to enter industry in technical maintenance fields should successfully accomplish the written and practical FAA examinations of the Air Frame and Power Plant rating. The four-year Technology curriculum with a major in Aeronautics is as follows:

FRESHMAN YEAR

Courses	Credits
IT 115, 117, 119	9
IT 116, 118, 120	9
Math 101, 105, 106	11
English 101, 102, 103	9
IT 168	3
ITE 130	3
MS, AS, or PE	3
Total	47

SOPHOMORE YEAR

IT 218, 220, 222	12
IT 219, 221, 223	12
ITE 151, 120, 121	9
Physics 111, 112 113[1]	15
Gen Engrg 102	1
Total	49

JUNIOR YEAR

IT 326, 328, 334	10
IT 317, 318, 319	9
English 305	3
Chemistry 111, 112	10
Group Requirements	11
Approved Electives	6
Total	49

SENIOR YEAR

IT 425, 427, 580	8
IT 519, 520, 540	10
Mfg Engrg 450, 315	7
Speech 305	3
Group Requirements	12
Approval Electives	9
Total	49

Automotive and Diesel Major prepares a student for industrial positions directly or indirectly related to Automotive and Diesel Technology, and responsible supervisory and administrative positions in such industries.

A successful graduate of this program will be a well-qualified, high-level technician capable of interpreting the designs of engineers and directing the work of skilled craftsmen. The four-year Technology curriculum with a major in Automotive and Diesel is as follows:

FRESHMAN YEAR

Courses	Credits
English 101, 102, 103	9
Math 101, 105, 106	11
IT 141, 140, 142	12
ITE 120, 121	6
ITE 160, 130	6
MS, AS, of PE	3
Total	47

SOPHOMORE YEAR

IT 243, 244, 245	13
Chemistry 111, 112	10
ITE 146, 250, 151	10
ITE 145	3
Gen Engrg 102	2
Group Requirements	10
Total	48

JUNIOR YEAR

IT 343, 344, 350	9
Physics 111, 112	9
IT 380, 381, 540	10
Group Requirements	10
Approved Electives	9
Total	48

SENIOR YEAR

IT 440, 442	6
English 305	3
Speech 305	3
Mfg. Engrg 450, 315	7
IT 445, 446, 441	9
IT 580	3
Group Requirements	8
Approved Electives	9
Total	48

Welding Major prepares the student to enter industry wherein highly technical welding skills and knowledge are required.

[1]Or approved alternates.

A successful graduate of this program will be a well-qualified, high-level technician in all phases of Welding Technology. The four-year Technology curriculum with a major in Welding is as follows:

FRESHMAN YEAR

Courses	Credits
IT 160, 165, 164	9
English 101, 102, 103	9
Math 101, 105, 106	11
ITE 120, 121	6
Gen Engrg 102	2
MS, AS, or PE	3
Group Requirements	8
Total	48

SOPHOMORE YEAR

ITE 151	3
IT 269	3
ITE 130, 131, 330	9
Physics 111, 112	10
Chemistry 111, 112	10
Group Requirements	13
Total	48

JUNIOR YEAR

Speech 305	3
Mfg Engrg 450, 315	7
English 305	3
IT 370, 371, 366	9
ITE 325	3
IT 363, 367	6
Group Requirements	9
Electives	8
Total	48

SENIOR YEAR

IT 472, 460	6
IT 568, 465	6
IT 574, 575	6
IT 569	5
IT 380, 381	6
Approved Electives	19
Total	48

General Courses

380. (191) Industrial Safety Education. Psychology and philosophy of accident causation and prevention in school, home, community and industry. Aspects of safety in the development of safety programs. (3W, Su) **Staff**

381. (192) Personnel Relations. Training for leadership in industry as foremen, supervisors, and directors. Problems of organizing, supervising training, and directing personnel. (3Sp) **Staff**

580. (112) Industrial Technology Seminar. Current topics in production methods, cost, design, supply, and organization. (2F, W, Sp) **Staff**

591. (198) Special Problems in Industrial Technology. Credit arranged. (F, W, Sp, Su) **Staff**

592. (199) Related Technical Training in Industrial Technology. A course provided for students enrolling in industry and factory schools conducted on the university level, wherein instructors, course content, and facilities have been approved by a committee functioning through the Industrial Technology Division. This course may be repeated for a maximum of nine credits to be acquired at a rate not to exceed one-and-a-half credits per 40-clock-hour week. Students should not expect to acquire more than three credits in this course in any one calendar year. Regular University fees must be paid and registration procedures followed. Credit arranged. **Staff**

Aeronautics Courses

115, 116. (5, 5A) Composite Aircraft Structure. Theory of flight, design, construction, repair, and maintenance of aircraft structures; textile skins, protective finishes, primary aircraft wood structures. Pertinent FAA regulations. (Three labs, three lectures) (3 and 3W) **Merrill**

117, 118. (6, 6A) All-Metal Aircraft Structures. Design, construction, repair, and maintenance of all-metal aircraft, including layout, template and flat plate development, bend allowance, hand forming, riveting procedure, alignment and jigging, power press and power shear operation, heat treatment, corrosion prevention. Pertinent FAA regulations. (Three labs, three lectures). (3 and 3Sp) **Merrill**

119, 120. (7, 7A) Aircraft Maintenance. Maintenance, repair, and alteration of modern aircraft including primary and secondary structures, and the various systems and appliances. Rigging, assembly, and general servicing. Pertinent FAA regulations. (Three labs, three lectures) (3 and 3Sp) **Merrill**

218, 219. (8, 8A) Aircraft Powerplants. Operation, maintenance and repair of reciprocating and turbine aircraft engines, model design factors, overhaul procedures, special tools and their proper application and powerplant testing. Lubricants and lubricating systems. (Five labs, five lectures) (4 and 4F) **Hill**

220, 221. (9, 9A) Aircraft Powerplant Accessories. Operation, maintenance and repairs of aircraft engine accessories including design factors. Fuel systems, carburetion and carburetors, fuel injection systems, ignition systems, charging systems, batteries and starting systems. Prerequisites: IT 218, 219 and ITE 130 or take concurrently. (Five lectures, five labs) (4 and 4W) **Hill**

222, 223. (10, 10A) Aircraft Powerplant Maintenance. Alteration, maintenance and operation of aircraft powerplants, including inspections, servicing, diagnosis of engine malfunctions and engine installations. Principles of operation and design factors of controllable, constant speed hydromatic, electric and reversible propellers. Prerequisites: IT 220, 221. (Five lectures, five labs) (4 and 4Sp) **Hill**

233. (11) Federal Air Regulations Radio and Airway Procedures. A ground school class for students and pilots. Open to all students. (2Sp) **Staff**

234. (12) Navigation. A study of maps, charts and solutions to the various navigational problems, including radio and instrument navigation. Open to all students. (3W) **Merrill**

235. (15) Private Pilot Certificate. Flying instruction essential to meet FAA flight proficeniency skill requirements for the private pilot certificate. Instruction is arranged for and paid by the student, with instruction offered by a University-approved airport operator. Beginning students should not register for more than one credit per quarter. (F, W, Sp) **Staff**

317. (117) Aerospace Vehicle Weight Analysis. Center of lift forces relationships to center of mass location. Loading control for large aircraft. (3F) **Merrill**

318. (118) Aircraft Hydraulics and Servos. (3W) **Merrill**

319. (119) Airworthiness Procedures. Manufacturing standards and in-service maintenance procedures employed by the aircraft industries. Prerequisites: IT 115, 117, 119, 317, 318. (3Sp) **Merrill**

326. (106) Turbo-Jet Propulsion. Thrust and performance, combustion systems, metallurgy, fuels, fuel controls, lubrication and ignition systems, aerodynamic problems, applications. (3F) **Summers**

328. (108) Turbo-Jet Propulsion, Advanced. Extension of fundamental theory to axial and centrifugal flow compressors, gas turbines, jet propulsion, turbo-prop engines. Prerequisite: IT 326. (3W) **Summers**

334. (114) Aircraft Electrical Systems and Equipment. Complex electrical systems used in larger aircraft. Prerequisites: IT 222, 130. (4Sp) **Staff**

335. (115) Commercial Pilot Certificate. Flight instruction to meet FAA requirements and completion of tests for certification. Prerequisites: Private pilot certificate; limit 10 credits. (F, W, Sp) **Staff**

425. (105) Aircraft Materials. Analysis of and design criteria for aircraft materials. Prerequisite: IT 119. (2W) **Staff**

427. (107) Flight Engineering. Relationships between altitude, power output, airplane performance, and the use of engine power curves, take-off and climb charts, cruising charts and flight logs. Prerequisite: IT 222. (4F) **Summers**

431. (111) Airline Organization. U.S. domestic air carrier route structures, Civil Aeronautics Board route operations, applicants and hearings, and typical organizational structures. (3Sp) **Summers**

433. (113) Airport Planning. Airport classifications, requirements, planning, and construction. Airport traffic control, runway design, special facilities, marking and lighting. State and federal agency financing. (3Sp) **Summers**

519. (109) Aircraft Design. Aerodynamic concepts relating to aircraft design. Characteristics of the atmosphere pertaining to aircraft flight. (3F) **Summers**

520. (110) Aircraft Design and Construction. Airfoil theory and geometry, NACA airframe development of life, and drag, moment coefficients, wing theory, high lift devices, and drag computations. Prerequisite: IT 519. (3W) **Summers**

Automotive Courses

140. (28) Automotive Engines. Theory and operation, construction principles, and overhaul procedures. (4F) **Willey**

141. (27) Chassis Systems. Brakes, steering mechanisms, suspension systems, frames, and wheel balance and alignment. (4W) **Willey**

142. (29) Driving Mechanisms. Operation and service of automotive-type clutches, standard transmissions and overdrives, U-joints, drive lines, and rear axle assemblies. (4Sp) **Wright**

146. (39) Diesel Engines. Two and four-stroke cycle diesel engines used in automotive vehicles and light tractors. (4W) **Wright**

150. (37) Body and Fender Repair. Body construction, alignment principles and repair procedures. (3F) **Willey**

155. (34) Auto mechanics for the Driver. For teachers of driver education and others interested in economical and prudent operation of the automobile. General operating principles and preventive maintenance procedures. (3Sp, Su) **Staff**

243. (24) Fuel Systems. Theory, operating principles, and maintenance of carburetors, fuel pumps, manifolds, superchargers, and governors. (5F) **Child**

244. (25) Electrical Systems. Theory, operating principles, and maintenance of ignition, generating, starting, and lighting systems. Prerequisite: ITE 130. (4W) **Child**

245. (26) Engine Tune-Up. Identification and correction of fuel and electrical system malfunctions to achieve optimum engine performance. Prerequisites: IT 243, 244. (4Sp) **Child**

343. (125) Fuels and Lubricants. Composition, characteristics, and refining processes; additive functions, physical measurements, and performance requirements. Prerequisites: IT 140, 243, (3F) **Child**

344. (126) Electrical Systems, Advanced. Construction and design characteristics of electrical components, solid state ignition, and control systems. Prerequisite: IT 244. (3W) **Child**

350. (127) Metal Refinishing. Metal preparation and refinishing processes, novelty finishes, protective applications, and color theory. (3S) **Willey**

440. (122) Automotive Engines, Advanced. Construction and design characteristics, analysis of power losses, balance and force factors, and machining operations. Prerequisites: IT 140, 243. (3F) **Child**

441. (121) Powered Chassis Systems. Power steering, power braking, and power suspension systems used on passenger and heavy-duty vehicles. Prerequisites: IT 141, 256. (3W) **Wright**

442. (123) Automatic Transmissions. Automatic transmission principles, fluid and electrical clutches, and torque converters. Prerequisites: IT 142, ITE 145. (3F) **Wright**

445. (128) Engine Testing. Diagnostic and testing procedures used in analyzing internal combustion engine performance. Use of scientific instruments. (3Sp) **Child**

446. (124) Fuel Injection Systems. Automotive diesel and gasoline engine injection system analysis, testing, and calibration. Prerequisites: IT 146, ITE 145. (3F) **Wright**

540. (135) Heat Engines. Elementary thermodynamics and basic heat power cycles. Prerequisite: Physics course covering heat. **Staff**

Welding Courses

160. (40) Fundamentals of Welding. Oxyacetylene welding, brazing and cutting; electric arc welding and resistance spot welding.

161. (41) Oxyacetylene Welding. (3Sp) **Staff**

164. (44) Arc Welding, Basic. Open to all university students. (3F, W, Sp) **Staff**

165. (45) Arc Welding, Certification. The development of welding skills to the level required for certification. Prerequisite: IT 164. (3Sp **Staff**

168. (48) Aero Welding. An introduction to welding, brazing, and cutting as applied to aircraft production and repair set forth by FAA regulations. (3F, W, Sp) **Staff**

269. (49) Arc Welding, Power Supplies. Theory, operating principles, and maintenance of modern electric arc welding equipment. Prerequisites: IT 164, ITE 130, 131. (3F) **Staff**

363. (143) Advanced Welding Processes. A survey of welding and bonding processes differing from common "arc welding." (3W) **Long**

366. (146) Weldability of Metals. Prerequisite: ITE 164. (3W) **Long**

367. (147) Advanced Electric Arc Welding. Technical information on advanced welding processes and skill development to ASME certification requirements. Prerequisite: ITE 265. (3Sp) **Long**

370. (140) Welding Design. Principles and processes relating to the design and fabrication of welded structures. Prerequisite: IT 164. (3W) **Long**

371. (141) Welding Estimating. Principles and procedures for planning and cost estimating a manufacturing sequence for welded items. Analysis of product design to determine procedures and work elements. Prerequisite: IT 370. (3Sp) **Long**

460. (new) Welding Fixture Construction. Prerequisites: IT 164, ITE 151, 385. (3W) **Long**

465. (145) Resistance Welding. Prerequisite ITE 330. (3Sp) **Long**

468. (148) Applied Welding Technology. A synopsis of welding technology by designing, estimating, processing, tooling, fabricating, and inspecting a welded product. Prerequisites: IT 165, 472, 363, 371, 575, 465, 366. (3Sp) **Long**

472. (142 Welding Inspection Methods. Prerequisite: IT 164. (3W) **Long**

569. (149) Heat Treating. Theory and practices relating to thermal treatment of weldments. Prerequisite: IT 575. (5Sp) **Long**

574. (144) Welding Metallurgy, Ferrous. Analysis of filler metals, defects, and thermal treatments of ferrous weldments. Prerequisite: IT 164. (3F) **Long**

575. (144A) Welding Metallurgy, Non-Ferrous. Analysis of filler metals, defects, and thermal treatments of non-ferrous weldments. Prerequisite: IT 574. (3W) **Long**

*Department of

Instructional Media

Head: Associate Professor Lester C. Essig, Jr.
Office in Merrill Library 216A

Associate Professors G. Leon Beutler, Don C. Smellie, R. Kent Wood

Assistant Professors D. LaMont Chappell,[1] Kathryn Gardner, LaDell C. Hoth,[2] Karlo Mustonen,[3] Reed Painter,[4] Max P. Peterson,[5] A. Jeffrey Simmonds,[6] John Mark Sorensen,[7] and Arlen L. Hansen[8]

Instructors Beverly B. Stone,[9] James Wardle,[10] Robert D. Woolley[11]

Lecturer Duane Hedin[12]

Degree: Master of Education (MEd)

Major: Instructional Media with emphasis in Library Science, Instructional Media Administration, or Instructional Systems Technology

Minor: Instructional Media with emphasis in Instructional Communications (A-V) or Library Science

Entry into Instructional Media programs is recommended during Summer or Fall Quarters because of sequence of courses. Programs **may be completed** during a series of summer sessions. All required courses are offered at least once during the academic year (September-June) and no less than every other summer.

Various organizational and administrative patterns have developed recently to provide instructional materials and services in elementary and secondary schools, colleges and universities, and industry. The term **media** is defined in the current American Library Association and National Education Association **Standards For School Media Programs** as "printed and audiovisual forms of communication and their accompanying technology." The term **instructional media** is adopted by this department to include the traditional studies of Library and Information Science, Instructional Communications (A-V), and the emerging field of Instructional Systems Technology. The term **instructional media center** is used to define the joint patterns of organization combining library, audiovisual and related services, whether it be in schools, colleges and universities, or industry. A three-track curriculum has been developed to allow specialization in instructional media center administration, library science or production of audiovisual materials through the Instructional Systems Technology program.

Professional educators are becoming increasingly aware of the vital importance of instructional media and services in the teach-

*In College of Education

[1]Associate Director for Acquisitions, Merrill Library and Learning Resources Program (MLLRP)

[2]Non-book Resources Librarian, MLLRP

[3]Head Reference Librarian, MLLRP

[4]Head Cataloger, MLLRP

[5]Associate Director for Distribution, MLLRP

[6]Special Collections Librarian, MLLRP

[7]Associate Director for Materials Selection, MLLRP

[8]Head of Photographic Services, MLLRP

[9]Adams School Media Coordinator, Logan City Schools

[10]Assistant Reference Librarian, MLLRP

[11]Administrative Assistant to University Librarian and to the Director, MLLRP

[12]Supervisor of Graphics Services (Graphics, Photography and Printing), MLLRP

ing-learning process. The present demand for qualified personnel to develop, administer and direct such programs is tremendous. At the present time, the educational field has a great need for proficiently trained and qualified specialists in this area. Opportunities exist in schools, colleges and universities, public and special libraries, and in industry.

The Department of Instructional Media cooperates closely with the Merrill Library and Learning Resources Program (MLLRP) and other **instructional media centers** to provide a relevant educational experience for students while they prepare for careers in media professions. The MLLRP was recently developed to provide for the current needs to improve and develop more fully the learning environment and services for USU students, faculty and staff. The cooperative program provides practical observation and field work experience in educational settings from elementary school through the university level. Just as medical schools provide hospitals and practicing professionals for education of students in the health and healing arts, the cooperative program of the MLLRP and the Department of Instructional Media provides a comparable program for student preparation in the media professions. Professional staff of library, radio and television, education, audiovisual and related services provide some of the classroom instruction and the guided field work experience, along with the full-time teaching faculty of the department. Five full-time faculty members, and twelve adjunct professors provide expertise in all areas, forming an especially qualified team of educators to provide a unique educational program for those students entering this department. Theory is put into practice, and the gap that often exists between the sometimes labeled "ivory tower" of the classroom and the "work-a-day" problems of the profession are brought into better focus for superior professional preparation.

INSTRUCTIONAL MEDIA ENDORSEMENT (Certification)

The Utah State Board of Education requires the following programs for those students who choose to serve as media specialists (librarians and media coordinators) in the public schools of Utah. Similar standards are being developed or are in effect in many other states. Students should check with the chief certification officer of the state they wish to serve so as to ascertain specific requirements. Because the Department of Instructional Media emphasizes the preparation of school media specialists (elementary through college level), programs may be worked out to meet the needs of individual students for certification. It is strongly recommended that students plan to certify (requires prior or concurrent teacher certification) if at all possible, since this preparation provides additional career opportunities.

Requirements for Instructional Media Endorsements by Utah State Board of Education. The Instructional Media Endorsement to the Basic Professional or the Professional Certificate became effective September 1, 1968. This endorsement will be required of all new personnel entering the media field.

1) Basic Professional Certificate

An applicant for the Instructional Media Endorsement to the Basic Professional Certifi-

cate for elementary or secondary schools must:

a) hold or be eligible to hold a Basic Professional Certificate endorsed for teaching at the appropriate level to which he is assigned.

b) have a minimum of twelve quarter hours of media classes with some study in each of the following areas:
   (1) Cataloging and classification
   (2) Organization and procedures
   (3) Production of audio-visual materials
   (4) Selection and utilization of print materials
   (5) Selection and utilization of non-print materials
   (4) Selection and utilization of Educational TV
   (5) Selection and utilization of programmed materials
   (6) Organization and procedures (Administration)
   (7) Production of audio-visual materials
   (8) Mass media
   (9) Information retrieval and data processing
   (10) Human and public relations
   (11) Leadership and supervision
   (12) Communication theory

c) Have at least three years of successful experience in education, one year of which must be as a classroom teacher.

d) Have the recommendation of an approved institution.

2) Professional Certificate

An applicant for the Instructional Media Endorsement to the Professional Certificate for elementary or secondary schools must:

a) hold or be eligible to hold a Basic Professional Certificate endorsed for teaching at the appropriate level to which he is assigned.

b) have completed a master's degree in an approved instructional media program, or 55 credits of approved post-baccalaureate credit including 30 credits of media course work with some study in each of the following areas:
   (1) Cataloging and classification of all types of media
   (2) Selection and utilization of print materials
   (3) Selection and utilization of AV materials

3) Dual Certification

a) Elementary to Secondary

An individual holding an elementary instructional media endorsement to the Basic Professional or Professional Certificate may qualify to serve as an instructional media specialist at the secondary level by demonstrating competency in secondary school curriculum and such other areas as mutually agreed upon by the preparing institution and the employing school district when applicable. A subject-matter major and minor, or composite major, shall not be required. Following a careful analysis of the individual needs of the candidate, the program prescribed should emphasize the acquisition of

the required competencies through district in-service activities, appropriate course work, and directed observation or other laboratory experience.

b) Secondary to Elementary

An individual holding a secondary instructional media endorsement to the Basic Professional or Professional Certificate may qualify to serve as an instructional media specialist at the elementary level by demonstrating competency in elementary school curriculum and such other areas as mutually agreed upon by the preparing institution and the employing school district when applicable. Following a careful analysis of the individual needs of the candidate, the program prescribed should emphasize the acquisition of the required competencies through district in-service activities, appropriate course work, and directed observation or other laboratory experience.

Note: Each endorsement will be limited to the instructional media field at the level where they have not otherwise qualified for certification.

4) Renewal of the Instructional Media Endorsements

a) Basic Professional Certificate

The Basic Professional Certificate may be renewed by presenting nine credits that will apply toward the Professional Certificate.

b) Professional Certificate

The Professional Certificate is renewable upon presentation of:

(1) Nine prior-approved college credits, or

(2) The equivalent of nine credits in **prior-approved** combinations of college credit, research projects, travel, work experience, or other professional activities, except that,

(3) An individual holding a proper Utah Instructional Media Endorsement who has completed 30 years of successful service, or an individual holding Utah elementary, secondary, or general administrative endorsements who has completed 15 years of service at age 55 may renew the certificate upon the recommendation of the employing school district, accompanied by plans for professional improvement which may include prior-approved combinations of college credit, research projects, travel, work experience, and other professional activities.

MEd Program in Instructional Media Center Administration

The greatest single demand for professionals in Instructional Media is for professionals prepared to plan, set up, and administer media programs. These programs have been identified by various titles, due to the newness of total media programs, as instructional media centers, library-media centers, school libraries, learning resource centers, and others.

The **instructional media center administrator** is concerned with an exciting and dynamic career at a time when there is great need for harnessing, organizing and making accessible the vast stores of proliferating knowledge and information through the application of communications technology. The IMC administration concept has been best defined as the application of library science to all materials that facilitate communications, along with their accompanying technology. Whether the information be stored between two layers of cardboard and called "book" or impregnated upon acetate and called "film," the role of the instructional media center administrator is to evaluate, select, acquire, organize, store and make accessible the information contained in these various "containers." He may be called upon to provide local production of materials to meet special needs of those he serves, or to tap the communication satellite to project images and sound from distant resources. The graduate program in Instructional Media Center Administration is a combination of Instructional Communications, Library Science, and related studies in Educational Television, and Photography. The following program meets the requirements for a Master of Education degree, as well as qualifying the student new to the media field for professional certification as a media specialist in the state of Utah. The program is accredited through NCATE (the National Council for Accreditation of Teacher Education).

Required Departmental Courses:

Courses		Credits
IM 501	Library Reference Services	3
IM 511	Library Materials Selection	3
IM 512	Reading Guidance	3
IM 521	Cataloging and Classification	3
IM 531	IMC Administration	3
IM 536	Communications Libraries	3
IM 539	Field Work	3
IM 541	Utilization of Audiovisual Media	3
IM 551	Production of Audiovisual Materials	3
IM 552	Local Production of Audiovisual Materials	3
IM 561	Instructional Media Communication Theory	3
IM 611	Evaluation and Selection of Inst. Media	3
IM 622	Library Science Automation Applications	3
IM 631	Library Administration and Management	3
IM 697	Research and Thesis Writing	3

In addition, the following courses are required to be taken in other departments:

Speech	584	Educational Broadcasting	3
Elem Ed	615	Foundations of Curriculum Development	3
		or	
Sec Ed	615	Foundations of Curriculum Development	3
Ed Adm	604	Measurement and Evaluation in Education	3
Ed Adm	666	Introduction to Research in Education	3
Ed Adm	710	Supervision in Public Schools	3
			60[1]

The student, adviser and graduate committee determine the program to meet the individual needs of the student and to insure proficient preparation in Instructional Media and related studies.

Library Science Program

Master's degree candidates in the department may elect a program to emphasize Library Science. Utah State Board of Education Media certification may be met by electing additional courses to comply with the earlier listed requirements.

For students with an undergraduate minor in Instructional Media emphasizing Library Sci-

[1]The 60-credit program is for students new to the field. The program for students having an undergraduate minor is 48 credits. Each student's program is designed and based upon previous preparation and experience.

ence, the program is 48 credits and the additional course work for media certification may be taken in the nine-credit elective block of the 48-credit program.

Required Courses:			Cerdits
IM	501	Library Reference Services	3
IM	511	Library Materials Selection	3
IM	512	Rearing Guidance	3
IM	521	Cataloging and Classification	3
IM	531	IMC Administration	3
IM	536	Communications and Libraries	3
IM	539	Field Work	
IM	541	Utilization of AV Media	3
IM	551	Production of AV Materials	3
IM	561	Instructional Media Communication Theory	3
IM	611	Evaluation and Selection of AV Media	3
IM	612	Publishing Industry	3
IM	613	Patterns and Problems of Adult Readers, or Engl 416 Children's Literature, or Engl 417 Literature for Adolescents	
IM	621	Technical Library Services	3
IM	622	Library Science Automation Applications	3
IM	631	Library Administration and Management	3
		Two of the three following:	
IM	506	Public Documents	3
IM	603	Literature and Research in Science	3
IM	604	Literature and Research in Social Science and Humanities	3
Elem Ed	615	Foundations of Curriculum Development	3
		or	
Sec Ed	615	Foundations of Curriculum Development	3
		or	
Ed Adm	748	Higher Education	3
Electives (nine-credit block)[1]			
			60[2]

Instructional Systems Technology Program

Master's degree candidates in the department may elect a program to emphasize Instructional Systems Technology with specialization in Production of Instructional Materials. Utah State Board of Education Media certification may be met by electing additional courses to comply with the earlier listed requirements.

Required courses:			Credits
IM	531	IMC Administration	3
IM	541	Utilization of AV Media	3
IM	542	Instructional Communications Designing	3
IM	551	Production of AV Materials	3
IM	552	Local Production of AV Materials	3
IM	553	Principles of Graphic Communication	3
IM	561	Instructional Media Communication Theory	3
IM	611	Evaluation and Selection of Instruction Media	3
IM	622	Library Science Automation Applications	3
		or	
Ed Adm	665	Systems Analysis and Application in Education	3
IM	651	Educational Display	3
IM	652	Educational Motion Picture Production	3
IM	653	Practicum in Learning Materials Production	3
IM	662	Sign Theory and Instruction	3
Psych	568	Techniques of Programmed Instruction	3
Elem Ed	614	Foundations of Curriculum Development	3
		or	
Sec Ed	615	Foundations of Curriculum Development	3
Sec Ed	604	Measurement and Evaluation in Education	3
Ed Adm	666	Introduction to Desearch in Education	3
ED Adm	710	Supervision in Public Schools	3
Speech	581	TV Production	3
Art	140	Photo Fundamentals	3
			60[1]

Minor in Instructional Media and Basic Media Endorsements

The Department of Instructional Media offers an Instructional Media undergraduate minor and basic media endorsement pro-

[1]The 48-credit program allows a nine-credit block of courses, which may include certification requirements or course work in other departments.

[2]The 60-credit program is for students new to the field. The program for students having an undergraduate minor is 48 credits. Each student program is designed and based upon previous preparation and experience.

[1]For students with an undergraduate minor in instructional media with emphasis in instructional communications, the required program is 48 credits. Each student's program is designed and based upon previous preparation and experience.

grams. Students who wish to prepare for careers in Instructional Media should prepare themselves as broadly in subject background as possible. A strong general education in the liberal arts is considered essential for the media specialists planning a career as a librarian, instructional media center administrator, or specialist in Instructional Systems Technology. Both programs below meet the Utah State Board of Education Basic Media Endorsement, if taken with teacher certification.

Minor in Instructional Media with Emphasis in Instructional Communications (A-V)

Courses		Credits
IM 511	Library Materials Selection	3
IM 521	Cataloging and Classification	3
IM 531	IMC Administration	3
IM 541	Utilization of Audiovisual Media	3
IM 551	Production of Audiovisual Materials	3
IM 552	Local Production of Audiovisual Materials	3
IM 542	Instructional Communications Designing	3
Speech 584	Educational Broadcasting	3
		24

Minor in Instructional Media, With Emphasis in Library Science

IM 501	Library Reference Services	3
IM 511	Library Materials Selection	3
IM 512	Reading Guidance	3
IM 521	Cataloging and Classification	3
IM 531	IMC Administration	3
IM 539	Field Work	3
IM 541	Utilization of Audiovisual Media	3
IM 551	Production of Audiovisual Materials	3
		24

Basic Media Endorsement for Elementary Education Majors

Because of the necessity for the elementary teacher to be prepared for teaching in at least two commonly taught subjects, he may elect an Instructional Media minor as a third minor in his elective block of course work, or may elect to meet minimal basic media endorsement by completing the following classes and being recommended by the Department of Instructional Media:

IM 511	Library Materials Selection	3
IM 521	Cataloging and Classification	3
IM 531	IMC Administration	3
IM 541	Utilization of Audiovisual Media	3
IM 551	Production of Audiovisual Materials	3
		15

Instructional Media Courses

100. (50) Use of Libraries and Learning Resources. A study of essential reference sources in general subject areas. Designed for all university students who wish detailed instruction on use of the USU Library and Learning Resources, rather than those planning to minor or major in Instructional Media or Library Science. Includes the use of dictionaries, encyclopedias, yearbooks, handbooks, periodical indexes, and the more important subject and trade bibliographies as well as audiovisual reference sources. (3F, W, Sp) **Woolley, Simmonds**

432. (132) Elementary School Library Administration. (Off campus only) Philosophy, scope of services, curriculum enrichment, special reference problems, and auxiliary programs with attention given to student assistant programs and community relations. Children's services of public libraries are included. Considered a service course, and does not count towards a degree program in the Department of Instructional Media. (3) **Gardner, Stone**

433. (133) Secondary School Library Administration. (Off campus only) Philosophy and scope of service, relationship to school curriculum, and library planning for secondary schools; expanded services and development of the Instructional Materials Center concept. (3) **Gardner, Stone**

501. (101) Library Reference Services. Builds a knowledge of the scope, significant characteristics, principles, and philosophy of information retrieval and bibliographic techniques. Each student is given the opportunity to explore the literature and important reference tools augmenting the major disciplines, as well as the major audiovisual reference sources. The case method of instruction is used to simulate reference service problems. (3F, Sp, Su) **Wood, Woolley**

506. (106) Public Documents. Bibliographies, catalogs, indexes, and other sources which are the keys in using public documents. Includes selected federal, state, and United Nations documents. (3W) **Mustonen**

511. (111) Library Materials Selection. General principles of materials selection, specific criteria for books, magazines, and related audio-visual materials for libraries and media centers. Use of standard selection aids and reviewing publications. (3F, Su)
Gardner, Sorensen

512. (112) Reading Guidance. Consideration is given to the needs of librarians and other persons concerned with reading programs in libraries and media centers. Special problems and interests related to work with children and young people, including use of audio-visual materials. Case studies dealing with reading programs and assistance to readers. Prerequisite: IM 511 or instructor's consent. (3W, Sp) **Gardner**

521. (121) Cataloging and Classification. Fundamental methods and techniques of cataloging and classification. Processing of print and audio-visual materials. Basic rules of entry, descriptive cataloging, filing, the **Dewey Classification System,** the **Anglo-American Cataloging Rules** and the Utah State Board of Education **Manual For Cataloging and Inventory Instructional Materials.** (3F, Sp, Su)
Hoth, Painter, Stone

531. (131) IMC Administration. The steps are initiating the administration of instructional media centers (IMC) programs for a single school, school district, college or university. Includes the study of organization, personnel, budgets, selection and evaluation of materials and equipment, providing for a wide variety of print and non-print services, and the planning for building and classroom facilities to effectively utilize instructional materials. (3W, Su) **Essig, Stone**

536. (136) Communication and Libraries. The historical development of writing, bookmaking, printing, mass media and educational technology. (3W, Su) **Wood**

539. (135) Field Work. Observation and guided practice under the direction of professional media personnel. Designed to give the student practical experience in the various types of library media centers, and bridge the gap between classroom theory and practice in the field. Ninety clock hours of field work, including a weekly conference with the supervisor. Prerequisites: IM 501, 521, 531, and 541 or 551, or instructor's consent. (3F, W, Sp, Su) **Gardner, Wardle**

541. (155) Utilization of Audiovisual Media. A basic course designed to give a broad overview of audiovisual equipment and its contribution in improving the educational experiences of the learner. Advantages and limitations of the major types of instructional media with training in the selection, operation and proper utilization of educational equipment and materials, with some practice in the design and preparation of more easily teacher-made materials. (3F, W, Sp, Su)
Beutler, Essig

542. (156) Instructional Communications Designing. Reviews the structure and utilization of the newer media and instructional systems in education, and applies the basic concepts of communication to problems in teaching and learning. Prerequisites: IM 541 or instructor's consent. (3W, Su) **Essig**

551. (165) Production of Audio-Visual Materials. Acquaints those in the educational field with the possibilities of creating instructional materials to meet their own professional needs. Teaches basic techniques for the production of a wide variety of both opaque and transparent visuals for display, study, and projection purposes. (3F, W, Sp, Su)
Beutler, Hedin, Smellie, Staff

552. (166) Local Production of Audio-Visual Materials. Advanced skills in the four production areas: illustration, mounting and preservation, lettering, and coloring. Training in message design through the creation of instructional materials to be used in the student's own teaching area. Prerequisite: IM 551. (3W, Su) **Beutler, Hedin, Smellie**

553. (new) Principles of Graphic Communication. The third in a sequence of learning materials production courses which build upon the basic areas of production utilizing principles of message design and communication theory. Learning materials will be created through laboratory exploration in the creative design and development of opaque and transparent visual imagery. (3Sp, Su)
Hedin, Smellie

561. (191) Instructional Media Communication Theory. Considers research and theory applicable to the classroom and the teaching-learning process. Communication models, communication barriers, influence of perception on learning, strengths and weaknesses of pictorial and verbal modes of representation. Prerequisites: IM 541 and 542 or instructor's consent. (3W, Su) **Essig**

570. (151) Instructional Media in Education. (Off campus only) Objectives and theory of instructional media in the educational process. Primarily for teachers, administrators and media personnel who have special needs related to instructional media and seek assistance in improving their local media programs. Offered on request. (3) **Staff**

571. (138) Media Workshop. A course primarily for students needing special training and experience in the latest concepts and innovations in instructional media. Course content changes from year to year studying the most recent topics and problems facing the profession. Content may be designed to meet the special needs of students desiring special work and instruction. (1-5, Su) **Staff**

590. (139) Independent Study. Provides for individually directed study. Prerequisite: Instructor's consent. Credit arranged. (F, W, Sp, Su) **Staff**

604. (102) Literature and Research in Social Sciences and Humanities. Detailed consideration of specialized representative bibliographical and reference materials in the various subject fields, with training and practice in their use for solving problems in reference services and research. Prerequisite: IM 501 or instructor's consent. (3W, Sp) **Peterson, Wood**

605. (102) Literature and Research in Science. Designed to acquaint the student with patterns of communications in the sciences and publishing of scientific literature. The student is required to familiarize himself with representative reference works and specialized source literature in various science disciplines and develop the skills necessary for successful literature searches. Special techniques of reference service in the pure and applied sciences are included. Prerequisite: IM 501 or instructor's consent. (3Sp) **Mustonen, Wood**

611. (251) Evaluation and Selection of Instructional Media. Training and practical experience in the evaluation and selection of a variety of instructional materials. Prerequisite: IM 541 or instructor's consent. IM 511 strongly recommended but not a required prerequisite. (3W, Su) **Smellie**

612. (new) Publishing Industry. Although printing and book making will be considered, this course is designed to emphasize publishing — that is the providing of material for sale to the public and circulation. Includes a look at the publishing history in the United States, Britain, and to a lesser extent the World Market. It also is designed to acquaint the student with individual publishing companies, book clubs, fairs, designs and reviews. In addition, copyright laws, publisher-author relationships, paperback books, University presses, vanity and subsidized publishing, and a look at standard directories, annuals, and periodicals dealing with the book trade. (3W, Su) **Sorensen, Wood**

613. (new) Patterns and Problems of Adult Readers. Designed for the graduate student in Library Science interested in working with adult patrons in public and academic libraries. Educational services for adults in libraries; adult reading interests as affected by abilities, age, sex, racial groups, environmental and cultural heritage; the educational role of the library related to the needs and interests of individuals and groups; techniques of advisory and group services appropriate for the library. This course is not an attempt to compensate for deficiencies in an undergraduate background in literature. (3Sp, Su) **Gardner, Sorensen**

615. (new) Using Media Center in Education. Designed to provide in-service training for teachers, librarians, and others in use of the media center. The course is approached with administrators, teachers, and media specialists working together to enhance the spectrum of learning opportunities and the exploration of how a team approach may accomplish improved learning in schools. (3Sp, Su) **Gardner, Stone, Wood**

621. (221) Technical Library Services. Concerns the procedures in the acquiring, recording, organizing, distributing, and preserving materials. Patterns of procedure and functions. Library of Congress classifications and technical cataloging covered in depth, as well as modern machine operations and application to technical library services. (3Sp, Su) **Painter, Wood**

622. (225) Library Science Automation Applications. An over-view of the theory, development, experimentations, and research in the automation of library processes. Completion of Introduction to Computer Science is recommended but not required. Prerequisite: IM 521. (3Sp, Su) **Chapple, Wood**

631. (231) Library Administration and Management. Basic principles and practices of library administration: planning, organization and management, supervision and control. Examination of current developments in administration and management theories and practices applicable to libraries. Prerequisites: IM 501, 511, 521, and 531. (3Sp, Su) **Wood**

651. (new) Educational Display. Laboratory practice in creating a variety of two- and three-dimensional educational displays utilizing principles of message design and materials production. Considers audience involvement patterns as they affect design of the message. (3Sp, Su) **Beutler, Hedin, Smellie**

652. (new) Educational Motion Picture Production. A laboratory course designed to develop individual skills in communicating with moving images. Involves the practical application of motion picture technology in the production of systematically designed learning-oriented messages. (3Sp, Su) **Hansen**

653. (new) Practicum in Learning Materials Production. A culminating course designed to allow the individual student to work with a production committee to design, produce and test an instructional message in terms of predetermined behavioral objectives as they relate to the intended change in learner behavior. (3Sp, Su) **Hedin, Smellie**

662. (new) Sign Theory and Instruction. An advanced course continuing Instructional Media Communication Theory as applied to the teaching-learning process. Four major areas in theory and research will be surveyed:

1) perception and its organization and reorganization; 2) communication-learning models in interaction theory; 3) language and linguistics as applied to message theory, then relating these to: 4) semiotics, or the science of signs, in the instructional communication process. Experience will be gained in probing trends in research through current literature. Prerequisite: IM 561. (3Sp, Su) **Essig**

670. (250) Educational Media Programs. Designed primarily as an in-service course for teachers, administrators and media personnel, to provide assistance in improved use of local media center facilities. (3) **Staff**

671. (238) Learning Resources Workshop. Designed for teachers, librarians, administrators and media specialists, to study the current needs of libraries and media centers in schools and communities in relation to the problems of education and the institutions served. Resources and organization of new media, development techniques for implementation of the instructional material center concept, as well as a review of the new books, magazines, and related audiovisual materials. (1-5Su) **Staff**

697. (285) Research and Thesis Writing. Individual work in thesis and Plan B report writing with guidance and criticism. (3F, W, Sp, Su) **Staff**

699. (400) Continuing Graduate Advisement. Required of graduate students who are not currently registered at the University but utilizing University facilities and laboratories, and the advice and criticism of staff and faculty members in completing thesis or Plan B report. (3F, W, Sp, Su) **Staff**

**Department of*

Landscape Architecture and Environmental Planning

Head: Professor Burton Taylor
Office in Technical Services 201

Associate Professor Craig W. Johnson

Assistant Professors Vern J. Budge, David H. Kotter, Gerald L. Smith

Instructor Fred Von Niederhausern

Lecturer Wendell Morse

Visiting Professors and Critics Wade Andrews, Robert L. Barre, David G. Biederman, Thad Box, Grady Clay, Robert Collier, Cliff Craig, Phillip E. DeTurk, Jerry Fuhriman, Francis Golffing, Karsten Hansen, Arthur Holmgren, Ray Hugie, Earl Israelson, McRay Johnson, Stuart Loosli, Robert Oaks, Owen Olpin, Ivan Palmblad, E. F. Perret, F. Peterson, Arlo Richardson, Lawrence Royer, Kenji Shiozawa, Dennis Smith, Carolyn Steel, Fred Wagner

Degrees: Bachelor of Landscape Architecture (BLA), Bachelor of Landscape Architecture & Environmental Planning (BS), Master of Landscape Architecture (MLA), Master of Science in Environmental Planning (MSEP)

Majors: Landscape Architecture and Environmental Planning

Landscape architecture is a profession dealing with both the scientific and the artistic use of land where decisions are based upon an in-depth study of all natural and human factors. These studies are focused upon optimum pleasure

*In College of Humanities, Arts and Social Sciences.

for the user and preservation of the land.

USU has the only Landscape Architecture program in the Intermountain area that is fully accredited by the ASLA. The department offers an intensive four-year program leading to a Bachelor of Landscape Architecture or Bachelor of Science in Landscape Architecture & Environmental Planning.

The curriculum is structured to offer a broad background in social, behavioral, and natural sciences together with technical studies in design, planting, and site engineering. Majors in LAEP work on projects at a variety of scales ranging from regional planning to residential properties. Emphasis is placed on realistic projects involving collaboration with the community and allied professions.

Successful completion of the curriculum prepares the student for graduate study or for positions in private offices or public agencies. Employment opportunities can be found in such areas as parks and recreation administration and design, regional planning, site and master planning, and urban design.

Each student's performance is reviewed by the faculty before admission is granted to upper division courses. Students majoring in LAEP are required to maintain a 2.5 g.p.a. in all departmental courses.

High school students planning to major in LAEP may obtain the necessary background with courses in art, natural science, social science, and math through trigonometry.

Specialized Service Courses. LAEP 103, 120, 490, 530, 570, 591, 685, and 690 are available for majors in other fields who may wish to gain an exposure to the different aspects of landscape architecture and environmental planning. A minor is not given in LAEP; however, these service courses are available, without prerequisites, for those requesting them.

Lower Division

FRESHMAN YEAR

Courses	Credits
LAEP 103 Introduction to LAEP	3
LAEP 120 Graphics	3
LAEP 130, 131 History of Landscape Architecture	6
LAEP 135 Theory of Design	3
English 101, 102, 103 Freshman English	9
Math 101, 105 Algebra	8
Math 106 Trigonometry	3
Botany 110 Elementary Botany	5
PE 100 Basic PE	1
PE 160 (Women), PE 162 (Men) Swimming	1
Elective PE	1
Advised group fillers	15
Total	58

SOPHOMORE YEAR

LAEP 140, 141, 142 Plant Materials	9
LAEP 160, 161 Architectural Design	6
LAEP 180 Introduction to the Planning Process	3
LAEP 181 Applied Theory of Design and Planning	3
LAEP 182 Regional Influences on Site Planning	3
LAEP 220 Graphics	3
Advised Group Fillers	15
Civil Engrg 221 Plane Surveying	3
Total	45

Upper Division

JUNIOR YEAR

LAEP 400 Professional Experience	0
LAEP 435 Travel Course	1
LAEP 540 Residential Land Use Planning	4
LAEP 541 Institutional and Urban Design	4
LAEP 542 Recreational Landscape Design	4
LAEP 550, 551, 552 Planting Design	9
LAEP 560, 561, 562 Landscape Construction	9
LAEP 570 City and Regional Planning	3
Advised Electives	12
	46

SENIOR YEAR

LAEP 490 Special Problems	Arr
LAEP 492 Professional Practicum	Arr
LAEP 495 Seminar	1
LAEP 520 Graphics	3
LAEP 530 Park and Recreational Planning	3
LAEP 532 History of Landscape Architecture	3
LAEP 580 Regional Resource Planning	4
LAEP 581 Terminal Design Project	4
LAEP 582 Senior Advocacy Program	4
LAEP 591 Ski Resort Development	3
Advised Electives	15
	40

Landscape Architecture and Environmental Planning Courses

Undergraduate

103. (3) Introduction to Landscape Architecture. Environment as a basis for land use and design decisions. Topics discussed include environmental awareness, the planning process, and design related to home, community, and the region. (3F, W, Sp, Su) **Staff**

120. (20) Graphics. Graphic techniques for landscape architectural drawings including plans, elevations, isometrics, perspective, rendering, and model construction. This course is a prerequisite for all upper division LAEP courses. (3F, W) **Johnson**

130. (30) History of Landscape Architecture. Physical planning as it relates to human experience from pre-history to the Dark Ages. Emphasis is placed on human dynamics and the application of historic thought to current and future design. Prerequisites: LAEP 103, 120. (3W) **Kotter**

131. (31) History of Landscape Architecture. A study and analysis of man's physical planning from the Dark Ages to recent times. Again emphasis is placed on human experiences and influences as they relate to current and future design decisions. Prerequisite: LAEP 130. (3Sp) **Kotter**

135. (35) Theory of Design. Basic elements of design with emphasis upon their relationship to landscape architecture. Form and spatial relationships are stressed through student development of three-dimensional design models. This course is a prerequisite for LAEP 180 series. (3Sp) **Johnson**

140. (40) Plant Materials. The taxonomic, ecological, aesthetic, and functional aspects of native and cultivated trees. A knowledge of fundamental botany principles and terms is assumed. Prerequisite: Botany 100 or equivalent. (3F) **Kotter**

141. (41) Plant Materials. Techniques used in planting design will be introduced, discussed, and studied in lecture, studio, and field. Emphasis is on plant oriented communicative skills. Prerequisite: LAEP 140 or equivalent. (3W) **Kotter**

142. (42) Plant Materials. A taxonomic, ecological, aesthetic, and functional study of shrubs, vines, and ground cover. Prerequisite: LAEP 140 or equivalent. (3Sp) **Kotter**

160, 161. (60, 61) Architectural Design. The design, construction, and orientation of structures as related to land areas and architectural functions. Prerequisites: LAEP 120, 135. (3W, Sp) **Niederhausern**

180. (80) Introduction to the Planning Process. Includes site survey, analysis, and design synthesis. Student teams survey and analyze a site's landscape and cultural resources. Each individual designs solutions for a realistic planning problem. LAEP 180 series is a prerequisite for all upper division LAEP courses. Prerequisites: LAEP 103, 120, 135. (3F) **Johnson**

181. (81) Applied Theory of Design and Planning. The student is asked to solve a variety of site planning problems. Building, site relationships, circulation, land use, and spatial delineation are studied during the course. Models, drawings, and oral presentations are used by the student to communicate his solutions. Prerequisite: LAEP 180. (3W) **Johnson**

182. (82) Regional Influences on Site Planning. Investigates changing regional land use patterns. Structured to study the evolution of natural patterns and cultural patterns. Studios are used to relate field data to site planning process through projects. Prerequisites: LAEP 180, 181. (3Sp) **Johnson**

220. (New) Graphics. Emphasis upon techniques and approaches to freehand sketching and rendering. Various media will be explored for preparing drawings and sketches for presentation. Prerequisite: LAEP 120. (3Sp) **Budge**

400. (100) Professional Experience. Prior to graduation all Landscape Architectural students must have completed three months experience in landscape architectural or planning position with a government or private organization. Evidence of work done and an oral or written report at the discretion of the department are required. No credit. (Su)

435. (135) Travel Course. A major field trip to examine a variety of projects in planning and design. Students are required to take this course at least once during their training. Credit arranged. (Sp)

490. (190) Special Problems. Selected problems to meet individual needs in completing

the professional training. Registration by permission only. Credit arranged. (F, W, Sp, Su) **Staff**

492. (192) Professional Practicum. Offers students an opportunity to study areas of practical professional interest. Credit arranged. (Sp) **Staff**

495. (195) Seminar. Readings and reports on current topics and trends in LAEP. Also covers contracts, specifications, professional ethics, and office practice. (1W) **Taylor**

520. (New) Graphics. Explores the relationship between presentation techniques and the printing process. The student will use various graphic media to delineate projects for printing of brochures, booklets, or pamphlets. Lectures on presentation techniques, layout, printing processes, and photographic reproduction will supplement studio projects. Video tape, film and slide presentations also included. Prerequisites: LAEP 120, 220. (3W) **Staff**

530. (130) Park and Recreational Planning. Analysis and development procedures in national, state and urban parks, forest lands, and private lands in terms of recreational and aesthetic values and uses. (3Sp) **Budge**

532. (132) History of Landscape Achitecture. The advanced student is exposed to the history of his profession from a review of pre-nineteenth century influences to an in-depth investigation of recent and current land planning decisions and the people and/or organizations responsible for them. Prerequisites: LAEP 130, 131. (3F) **Kotter**

540. (140) Residential Land Use Planning. A study of housing, planning approaches, concepts, and innovations. Each student prepares a design solution for a housing development on an actual or theoretical site. Utilizes both the individual and team approaches with lectures, seminars, and guest speakers. Prerequisite: LAEP 180 series. (4F) **Budge**

541. (141) Institutional and Urban Design. Includes the study of institutional master planning and small scale problems relating to the urban environment. Design projects in various areas. Seminars, field trips, guest lecturers, and studio involvement. Prerequisite: LAEP 540. (4W) **Budge**

542. (142) Recreational Landscape Design. Includes the design approach for a variety of recreational projects. Emphasis on forest recreation, site planning, and playground development. Field trips, actual project design, seminars, and guest lecturers. Prerequisites: LAEP 540, 541. (4Sp) **Budge**

550. (150) Planting Design. Relationships between the plant and its physical environment. Teams of students analyze native plant communities in the field seeking all plant-environment relationships applicable to plant design. Short Studio problems applying these findings to plant composition. Prerequisite: LAEP 140 series. (3F) **Johnson**

551. (151) Planting Design. The student is exposed to specific aspects of planting design including climate control, circulation definition, screening, and aesthetic considerations. Projects deal with a variety of land uses. Detailed planting plans and study models are used to investigate each problem. Guest lecturers and visiting critics contribute during the quarter. Prerequisite: LAEP 550. (3W) **Johnson**

552. (152) Planting Design. Technical aspects of planting design including layout, planting details, specifications, maintenance, and cost estimating are studied through lectures, studio projects, and field experience. Detailed drawings, specifications, and cost estimates are prepared for projects completed during the quarter. Prerequisites: LAEP 550, 551. (3Sp) **Johnson**

560. (160) Landscape Construction. This course is an introduction to site engineering, grading, cut and fill calculation, retaining walls, and basic wood construction. Prerequisites: Math 136, Civil Engineering 221. (3F) **Budge**

561. (161) Landscape Construction. Advanced grading with emphasis toward runoff calculations, utility systems, cost estimating, and construction drawings. Individual reports on construction material. Prerequisite: LAEP 560. (3W) **Budge**

562. (162) Landscape Construction. Aesthetics and theory of highway and roadway alignment, horizontal and vertical curves, roadway perspective, construction detailing. Development of a complete set of construction drawings of a design project to encompass all aspects studied in the 560 series will be the terminal project. Prerequisites: LAEP 560, 561. (3Sp) **Budge**

563. (163) Architectural Design. An integrated series of problems, graduated in complexity and covering modular housing design, structural systems, and new town planning as related to the natural and man-made environment. Prerequisites: LAEP 160, 161. (3F) **Niederhausern**

570. (170) City and Regional Planning. An introduction to the procedures and methods of city and regional planning. Legislative, administrative, and effectuation of the general comprehensive plan. Analysis of physical design aspects of town and city. (3W) **Taylor**

580. (180) Regional Resource Planning. Major emphasis on regional analysis theory. Its application is pursued through team-oriented

projects in land use planning, planned unit development, recreation planning, and community planning. A lecture sequence accompanies the studio. Prerequisite: LAEP 540 series. Recommended: Geology 560, Meteorology 117, and one Ecology course. (4F) **Smith**

581. (181) Terminal Design Project. This course allows the individual student to select a project, conduct research, write the design program, and generally progress through the planning process solely on his own volition. The student's project is intended to be as close to an actual professional basis as possible. Prerequisite: LAEP 580. (4W) **Smith**

582. (182) Senior Advocacy Program. This course is based on the competition project. It offers to the student the continued opportunity of professional realism with practical experience and monetary remuneration for his efforts. Each year the competition varies and allows community involvement. Prerequisites: LAEP 580, 581. (4Sp) **Smith**

591. (191) Ski Resort Development. Specific problems involved in ski area selection and design. Includes a feasibility study, the selection and arrangement of lifts, runs, structures, parking and roads in preliminary design form. The course will include field trips, flights, and will produce models, sketches, drawings, and a brochure, all to be publicly presented at the end of Winter Quarter. (3W) **Kotter**

Graduate

601. (New) Omni Studio I. Structured to offer a general coverage of theory and application of regional planning. Related areas of study include highway alignment, regional plant associations, and watershed preservation and management practices. Graphics will be used throughout the course to assist in the visualization of the regional landscape. The student will pursue the development of graphic skills as the course progresses. A lecture sequence accompanies the course. (6F) **Staff**

602. (New) Omni Studio II. Structured to offer a general coverage of man's impact on the landscape. Areas to be studied are new towns, planned unit development, utility facilities, urban centers, and various modes of transportation necessary to link the urban centers together. Graphics will be used throughout the course to assist in the visualization of these man-made functions. The student will pursue development of graphic skills as the course progresses. A lecture sequence accompanies the course. Prerequisite: LAEP 601. (6W) **Staff**

603. (New) Omni Studio III. Structured to offer a general coverage of site planning and principles. A study of site inventory and analysis along with the principles of design, relationships of site functions and spaces, earthwork calculations and grading, site construction details and drawings, and graphic abilities related to the sketching of design ideas. A lecture sequence accompanies the course. Prerequisites: LAEP 601, 602. (6Sp) **Staff**

610. (210) Regional Investigations. Concentrated investigation and research of a subregional landscape. The major focus is to discover development trends and patterns, and these form a basis for possible improvements in the planning structure that regulates development. A lecture sequence accompanies the course. A course of study in natural systems is required for all non-majors with approval of the instructor. (4F) **Smith**

611. (211) Planning Procedures. Composed of a potpourri of project models with student experiments in innovative planning procedures. A varied range of projects involving such areas as community, recreation, regional, highway and campus planning. A lecture sequence accompanies the course. Prerequisites: LAEP 610, Computer Science 150. (4W) **Smith**

612. (212) Urban Design. A thorough study of urban problems with emphasis on physical, social, and pathological conditions. These are investigated by the use of analytical planning processes. A lecture sequence and numerous field trips accompany the course. Prerequisites: LAEP 610, 611 and Urban Sociology or equivalent. (4Sp) **Smith**

613, 614, 615. (310, 311, 312) Landscape Architectural Design. This series covers design planning construction and office procedures. Includes design, critical path techniques, computer use in construction, recreation site planning, and production of design briefs. The series is designed for students pursuing the professional MLA degree. A seminar sequence will accompany the course. (3F, W, Sp) **Johnson**

616. (316) Professional Practice. Graduate readings and reports on current topics and trends in landscape architecture and environmental planning. (1F, W, Sp) **Taylor**

680. (220) Thesis Seminar. Introduction to thesis writing. Assignments will encourage title selection, hypothesis, prospectus and research. Emphasis will be on all phases of thesis production. Explanation and clarification of alternatives the graduate student has in the pursuit of the thesis is included. (2F, Sp) **Staff**

685. (295) Interdisciplinary Seminar. Brings together staff and students in other disciplines to discuss and review problems in concepts of environmental planning. Selected readings, presentations, and assignments will be made. (2Sp) **Smith**

690. (290) Special Problems. This course has two purposes: one is to fulfill the requirement for advanced degrees in LAEP. The other is to present a special problems course for students in other fields who are working toward advanced degrees in allied professions such as Forest Recreation, Engineering, Education, etc. Credit arranged. (F, W, Sp, Su) **Staff**

697. (new) Thesis Research. Credit arranged. (F, W, Sp, Su) **Staff**

698. (new) Research Consultation. Credit arranged. (F, W, Sp, Su) **Staff**

699. (new) Continuing Registration. Credit arranged. (F, W, Sp, Su) **Staff**

797. (new) Thesis Research. Credit arranged. (F, W, Sp, Su) **Staff**

798. (new) Research Consultation. Credit arranged. (F, W, Sp, Su) **Staff**

799. (new) Continuing Registration. Credit arranged. (F, W, Sp, Su) **Staff**

**Department of*

Languages and Philosophy

Head: Professor L. Grant Reese

Associate Head of Philosophy: Associate Professor A. Berry Crawford

Office in Main 210

Professors Carl T. Degener, Austin E. Fife

Professor Emeritus Thelma Fogelberg

Associate Professors John M. Beyers, Gordon E. Porter, Marian Robertson

Assistant Professors Jerry L. Benbow, Lynn R. Eliason, Klara Ingold, John E. Lackstrom, Hans K. Mussler, Kent E. Robson, Alfred N. Smith, Valentine Suprunowicz

Instructor Wendell W. Smith

Lecturers Anne S. Johnson, Viva Lynn

Degree: Bachelor of Arts (BA)

Majors: French, German, Spanish, and Philosophy

The department offers a program in Philosophy which leads to the Bachelor of Arts degree or which can substantially support undergraduate or graduate programs in other fields.

Long recognized as desirable in humanistic education, the study of languages today is also sought for its practical value in international communication. The Bachelor of Arts degree is offered in French, German, and Spanish and is designed to prepare students for admission to advanced degree programs in languages, for secondary school teaching certification, or for foreign careers. Skill classes are available in Russian, Portuguese, Latin and Greek. In the modern languages emphasis is placed equally on the four basic language skills: speaking, listening, reading and writ-

*In College of Humanities, Arts and Social Sciences.

ing. The Language Laboratory permits the student to do as much individual work in speaking and listening as he desires.

Students not majoring in a language often have additional opportunities made available to them by combining the mastery of a foreign language with their major in another field. Students planning to do graduate work should consider the study of one or two languages an essential part of their undergraduate preparation.

The department offers courses for credit in English for non-native speakers. For non-native speakers of English who need to improve their use of English before they can enroll in a university program, this department co-sponsors with the Office of International Programs the Intensive English Language Institute each quarter.

Other special language offerings include a course in general linguistics and a two-year program in Mandarin Chinese combining self-study with tutorial assistance.

Language Major

A) **Candidacy.** To become a candidate for a major in a language, the student must have completed two years of lower division work, or the equivalent, in the language. Equivalent preparation acquired through high school study or foreign residence will be determined by means of proficiency tests administered by the Department of Languages.

B) **Major requirements** include forty upper division credits in the selected language, plus Linguistics 540. Majors also wishing a secondary teaching credential must take French 304, 305, and 501; German 304, 305, and 501; or Spanish 304, 305, and 501; plus Education 340 in the College of Education.

Candidates for a secondary teaching credential should take Linguistics 540 and French 501, German 501, or Spanish 501 before the end of their Junior year and prior to taking Education 340.

They must also complete the other professional education courses required for certification (see College of Education for requirements).

An "application for admission to teacher education" should ordinarily be completed before the Junior year (see College of Education). Approval is a prerequisite to teacher certification candidacy and to enrollment in Education and Psychology courses.

C) **Requirements Supporting the Major.** (45 credits)

1) One year in a second language.

2) Groups: either 15 credits each in two of the three following areas or 10 credits in each; specific courses to be approved by the candidate's faculty adviser.

a) Literature courses in English or in a language other than the major; Philosophy.

b) History, Sociology, Economics, Political Science, or Anthropology.

c) Fine Arts: Speech, Theatre, Art, Music, Landscape Architecture.

D) **Minor Requirements.**

1) Students majoring in a modern language will be considered to have completed their minor requirements on completion of C) above. However, under certain conditions to be ascertained by the adviser, waiver of all or part of these requirements may be

granted in favor of equivalent course work in another area.

2) For a teaching minor in a foreign language with the recommendation of the Department of Languages a student must complete 24 credits of approved upper division work in one language including advanced grammar and applied linguistics. Education 340 is required and may be counted as part of the 24 credits.

Proficiency Tests and Placement in Language Courses. Students who have completed one or more years of language study in high school will not be admitted to elementary (1st quarter) courses in that language except by special permission of the department. Listening and reading skills tests will be used to determine the proper placement of students with previous language experience.

Credit by Special Examination. Where basic skills in a language have been acquired by means other than college courses up to 25 lower division credits may be earned by special examination. To qualify for a special examination a student must complete one college course in that language at the appropriate level with a grade not lower than B−.

Language Laboratory

Laboratory practice sessions are required for all lower division language classes and for some upper division classes; three half-hour sessions is the minimum requirement in all lower division classes; a fee of $2 per quarter is charged for this service.

Spring Quarter in Mexico

USU offers properly qualified students the opportunity to spend Spring Quarter in Mexico at the University of the Americas. To qualify, students must be recommended for this program by their advisers. Though particularly designed for students interested in Spanish, Sociology-Anthropology, Fine Arts, Political Science, International Relations, or History, a student in any field at USU can qualify in the manner indicated.

English Courses for Foreign Students

The proficiency in English of each non-native speaker will be determined by oral interview and/or appropriate tests. Where the need is clear, they will be required to enroll in special courses designed for them prior to or concurrently with their enrollment in courses in Freshman English offered by the Department of English and Journalism.

Foreign students whose English proficiency is inadequate for matriculation at USU will be able to enroll on a full-time basis in the Intensive English Language Institute any quarter throughout the academic year or summer. Successful completion of this institute indicates adequate proficiency in English to begin university study. A foreign student may repeat the institute if necessary. No credit is given for this institute.

French Courses

Lower Division

100. (10) Aspects of Modern French Culture. Introduction to principal social, artistic, and literary aspects of modern French culture. Taugh in English. (3F) **Staff**

101. (1) Elementary French, 1st Quarter. A beginner's course not open to students having had more than one year of French in high school or the equivalent. (5F) **Staff**

102. (2) Elementary French, 2nd Quarter. A beginning course open to students having

had French 101 or at least one but not more than two years of French in high school. (5F, W) **Staff**

103. (3) Elementary French, 3rd Quarter. Open to students having completed French 102. (5W, Sp) **Staff**

201. (4) Intermediate French. Prerequisite: French 103 or at least two but not more than three years of French in high school. (5F) **Staff**

202. (5) Intermediate French. Prerequisite: French 201. (5W) **Staff**

280, 281, 282. (196, 197, 198) French for Advanced Degree Candiates. A beginning course designed to give minimal reading skills. This course may not be used toward fulfillment of the language requirement for the Bachelor of Arts or Master of Arts degree. (3F, 3W, 3Sp) **Staff**

299. (new) Individual Reading. Individual study of selected readings in French for students desiring reading experience beyond French 202 before entering upper division classes. Credit arranged. (F, W, Sp) **Staff**

Upper Division

300. (100) Introduction to French Literature. (5F, Sp) **Staff**

304. (104) Advanced Grammar, Conversation and Composition. (5) **Staff**

305. (105) Advanced Grammar, Conversation and Composition. (5) **Staff**

***420. (118) Contemporary French Civilization.** Role of France in the modern world; social, political, ecnomic and religious life and institutions; review of artistic and scientific achievements. (3F) **Staff**

461. (107) Survey of French Literature. An overview of French literary movements and transitions from the beginning to the present day. (5W) **Staff**

501. (113) Applied Linguistics and Phonetics. Phonological, morphological, and syntactical problems in learning French. (5W) **Staff**

***520. (143) Middle Ages and the Renaissance.** Readings in the Middle Ages: lyric, epic, and didactic literature, the theatre and romances. Literature of the 16th century: the Pleiade, Rabelais, Montaigne, and Ronsard. (4Sp) **Staff**

****532. (140) The Classical Tragedy: Corneille and Racine.** Plays of Corneille and Racine. (4Sp) **Staff**

***533. (139) Seventeenth Century: Moliere and Other Writers.** Comedies of Moliere, selected readings by Descartes, Pascal, La Fontaine, La Rochefoucauld, Boileau. (5F) **Staff**

***541. (134) The Eighteenth Century.** Selected readings by Montesquieu, Voltaire, Diderot, Rousseau, Bernardin de Saint-Pierre, Prevost. Comedies of Beaumarchais and Marivaux. (5Sp) **Staff**

****552. (133) Romanticism in France.** Readings from the works of Chateaubriand, Hugo, Vigny, Musset, Lamartine. (4F) **Staff**

****554. (141) Realism, Naturalism, Symbolism.** French literature 1850-1900; representative novelists, dramatists, poets, and critics of this period. (4W) **Staff**

****571. (150) The Twentieth Century.** Representative novelists, dramatists, poets and critics. (4Sp) **Staff**

599. (199) Readings and Conferences. Readings in scientific, technical or literary French. Credit arranged. Not more than five credits total may be earned by any student. (F, W, Sp) **Staff**

German Courses

Lower Division

100. (10) Aspects of Modern German Culture. Introduction to principal social, artistic, and literary aspects of modern German culture. Taught in English. (3F) **Staff**

101. (1) Elementary German, 1st Quarter. A beginner's course not open to students having had more than one year of German in high school or the equivalent. (5F) **Staff**

102. (2) Elementary German, 2nd Quarter. A beginning course open to students having had German 101 or at least one but not more than two years of German in high school. (5F, W) **Staff**

103. (3) Elementary German, 3rd Quarter. Open to students having completed German 102. (5W, Sp) **Staff**

201. (4) Intermediate German. Prerequisite: German 103 or at least two but not more than three years of German in high school. (5F) **Staff**

202. (5) Intermediate German. Prerequisite: German 201. (5W) **Staff**

280, 281, 282, (196, 197, 198) German for Advanced Degree Candidates. A beginning course designed to give minimal reading skills. This course may not be used toward fulfillment of the language requirement for the Bachelor of Arts or Master of Arts degree. (3F, 3W, 3Sp) **Staff**

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*Taught 1971-72.
**Taught 1972-73.

299. (new) Individual Reading. Individual study of selected readings in German for students desiring reading experience beyond German 202 before entering upper division classes. Credit arranged. (F, W, Sp) **Staff**

Upper Division

300. (100) Introduction to German Literature. (5F, Sp) **Staff**

304. (105) Advanced Grammar, Conversation and Composition. (5F) **Staff**

305. (106) Advanced Grammar, Conversation and Composition. (5W) **Staff**

*420. **(116) Germanic Cultures.** Socio-political, historical, economic, literary and cultural trends in German-speaking countries. (3F) **Staff**

461. (107) Survey of German Literature. General view of literary periods, movements, and cultural background with representative readings of major writers. (5W) **Staff**

501. (112) Applied Linguistics and Phonetics. Phonological, morphological, and syntactical problems in learning German. (5W) **Staff**

511. (120) The German Novelle. Historical and theoretical development of the German novelle. (4F) **Staff**

*513. **(123) The German Novel.** Historical and theoretical development of the German novel. (5F) **Staff**

*517. **(133) The German Drama.** Historical and theoretical development of the German drama. (5Sp) **Staff**

519. (134) German Lyric and Ballads. Historical development of German lyrics and ballads. (4Sp) **Staff**

540. (121) Lessing and Schiller. Poems and dramatic works of Lessing and Schiller; study of their biographies. (5F) **Staff**

543. (129) Goethe: Works and Biography. Goethe's works with special emphasis on his lyric contributions; his biography. (4Sp) **Staff**

589. (new) Problems in German Literature. Senior seminar on selected critical topics in German literature; may be repeated for credit. (3Sp) **Staff**

599. (199) Readings and Conferences. Readings in technical, scientific, and literary German. Credit arranged. Not more than five credits total may be earned by any student. (F, W, Sp) **Staff**

Greek Courses

101, 102, 103. (1, 2, 3) Elementary Greek. Emphasis is placed on mastering the basic grammar, and developing skills to read the simpler prose, such as excerpts from Xenophon and Herodotus. (Taught only on sufficient demand.) (3F, 3W, 3Sp) **Staff**

Latin Courses

101, 102, 103. (1, 2, 3) Elementary Latin. (Taught only on sufficient demand.) (3F, 3W, 3Sp) **Staff**

201, 202, 203. (4, 5, 6) Intermediate Latin. Open to students who have had one year of college Latin or two years of high school Latin. (Taught only on sufficient demand.) (3F, 3W, 3Sp) **Staff**

299. (108) Individual Readings. Individual study of selected readings in Latin for students desiring reading experience beyond 203 before doing advanced work. Credit arranged. (F, W, Sp) **Staff**

Linguistics

113, 114, 115. English for Foreign Students. Structure of the language, with exercises and drills for increasing comprehension and ability to write accurately. Required of all foreign students who have failed to make required scores on English proficiency examinations on entering college. May be used as an elective by others. (3F, 3W, 3Sp) **Staff**

120. English Phonetics for Foreign Students. To train in the sounds of English and to increase ability to speak with the rhythm and intonation of American English. May be taken in conjunction with 113, 114, 115. (3F, W, Sp) **Staff**

540. (100) Introduction to Linguistics. Theory of language and survey of structural and generative phonology, morphology, syntax; language differentiation; negative language acquisition; second language learning. (5F) **Lackstrom**

Mandarin Courses

101H. (1H) Elementary Mandarin Chinese. A beginning course based on self-study with tutorial assistance. (5F, W, Sp) **Staff**

102H. (2H) Elementary Mandarin Chinese, 2nd quarter. Course based on self-study with tutorial assistance. (5F, W, Sp) **Staff**

103H. (3H) Elementary Mandarin Chinese, 3rd quarter. Self-study with tutorial assistance. (5F, W, Sp) **Staff**

201H. (new) Intermediate Mandarin Chinese. Self-study with tutorial assistance. (5F, W, Sp) **Staff**

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*Taught 1971-72.
**Taught 1972-73.

202H. (new) Intermediate Mandarin Chinese. Self-study with tutorial assistance. (5F, W, Sp) **Staff**

Portuguese Courses

Lower Division

100. (10) Aspects of Modern Portuguese - Brazilian Culture. An introduction to principal social, artistic, and literary aspects of modern Portuguese-Brazilian culture. Taught in English. (3F) **Porter**

101. (1) Elementary Portuguese, 1st quarter. (5F) **Porter**

102. (2) Elementary Portuguese, 2nd quarter. (5W) **Porter**

103. (3) Elementary Portuguese, 3rd quarter. (5Sp) **Porter**

201. (4) Intermediate Portuguese. (3F) **Porter**

202. (5) Intermediate Portuguese. (3W) **Porter**

203. (6) Intermediate Portuguese. (3Sp) **Porter**

299. (new) Individual Readings. Individual study of selected readings in Portuguese for students desiring experience beyond Portuguese 203 before entering upper division work. Credit arranged. (F W, Sp) **Porter**

Upper Division

599. (199) Readings and Conferences. Readings in scientific, technical, or literary Portuguese. Credit arranged. Not more than five credits total may be earned by any student. (F, W, Sp) **Porter**

Russian Courses

Lower Division

100. (10) Aspects of Modern Russian Culture. Introduction to principal social, artistic, and literary aspects of modern Russian culture. Taught in English. (3F) **W. Smith**

101. (1) Elementary Russian, 1st quarter. (5F) **W. Smith**

102. (2) Elementary Russian, 2nd quarter. (5W) **W. Smith**

103. (3) Elementary Russian, 3rd quarter. (5Sp) **W. Smith**

201. (4) Intermediate Russian. (5F) **W. Smith**

202. (5) Intermediate Russian. (5W) **W. Smith**

280, 281, 282. (196, 197, 198) Russian for Advanced Degree Candidates. A beginning course designed to give minimal reading skills. This course may not be used toward fulfillment of language requirement for Bachelor of Arts or Master of Arts degree. (3F, 3W, 3Sp) **W. Smith**

299. (199) Individual Readings. Individual study of selected readings in Russian for students desiring reading experience beyond 202 before doing upper division work. Credit arranged. (F, W, S) **W. Smith**

Upper Division

599. (new) Readings and Conferences. Readings in technical, scientific, or literary Russian. Credit arranged. Not more than five credits total may be earned by any student. (F, W, Sp) **W. Smith**

Spanish Courses

Lower Division

100. (10) Aspects of Modern Hispanic Culture. Introduction to principal social, artistic, and literary aspects of modern Hispanic culture. Taught in English. (3F) **Staff**

101. (1) Elementary Spanish, 1st Quarter. A beginner's course not open to students having had more than one year of Spanish in high school or the equivalent. (5F) **Staff**

102. (2) Elementary Spanish 2nd Quarter. A beginning course open to students having had Spanish 101 or at least one but not more than two years of Spanish in high school. (5F, W) **Staff**

103. (3) Elementary Spanish, 3rd Quarter. Open to students having completed Spanish 102. (5W, Sp) **Staff**

201. (4) Intermediate Spanish. Prerequisite: Spanish 103 or at least two but not more than three years of Spanish in high school. (5F) **Staff**

202. (5) Intermediate Spanish. Prerequisite: Spanish 201. (5W) **Staff**

280, 281, 282. (196, 197, 198) Spanish for Advanced Degree Candidates. A beginning course designed to give minimal reading skills. This course may not be used toward fulfillment of the language requirement for the Bachelor of Arts or Master of Arts degree. (3F, 3W, 3Sp) **Staff**

299. (new) Individual Reading. Individual study of selected readings in Spanish for students desiring reading experience beyond Spanish 202 before entering upper division classes. Credit arranged. (F, W, Sp) **Staff**

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*Taught 1971-72.
**Taught 1972-73.

Upper Division

300. (100) Introduction to Hispanic Literature. (5F, Sp) Staff

304. (105) Advanced Grammar, Conversation and Composition. (3F) Staff

305. (106) Advanced Grammar, Conversation and Composition. (3W) Staff

****420. (135) Hispanic Culture.** The social, political, and economic conditions of Spain and the Spanish American countries. (4F) Staff

461. (107) Survey of Spanish Literature. Development and trends in peninsular literature from the 12th century to the present. (5W) Staff

462. (109) Survey of Spanish American Literature. Development and trends in Spanish American literature from the discovery to the present. (5Sp) Staff

501. (112) Applied Linguistics and Phonetics. Phonological, morphological, and syntactical problems in learning Spanish. (5W) Staff

***518. (130) The Literature of the Siglo de Oro.** A study of writers of the Siglo de Oro: Lope de Vega, Tirso de Molina, Calderon de la Barca and others. Prerequisite: Spanish 300 or 461. (4Sp) Staff

****530. (129) Cervantes.** Don Quixote. Prerequisite: Spanish 461 or instructor's consent. (4Sp) Staff

****564. (128) Modern Hispanic Poetry.** Representative poets of Spain and Spanish America since 1800. (5Sp) Staff

***565. (143) Modern Hispanic Drama.** A study of peninsular and Spanish American theater since the Siglo de Oro. (5F) Staff

***566. (145) Modern Hispanic Novel.** Prerequisite: Spanish 300 or instructor's consent. Development of the novel in Spain and Spanish America in the 19th and 20th centuries. (5Sp) Staff

599. (199) Readings and Conferences. Readings in scientific, technical or literary Spanish. Credit arranged. Not more than five credits total may be earned by any student. (F, W, Sp) Staff

Philosophy

Philosophy Major requirements include the following:

A) Forty-five credit hours in Philosophy with the following distribution requirements:

1) Logic. One of the following: 210, 522. 2) Value Theory. Two of the following: 111, 112, 215, 370, 410, 411. 3) Metaphysics or Epistemology. One of the following: 501, 530, 585. 4) "Philosophies of." One of the following: 325, 350, 415, 535, 560, 605. 5) History of Philosophy. 310 and 312 and one of the following: 311, 313, 315, 316.

B) Two years of a foreign language or its equivalent.

Philosophy Courses

Undergraduate

101. (10) Introduction to Problems of Philosophy. Problems of reality, thought, and value in relation to the modern world. For students preparing for more advanced courses in philosophy and for those desiring an introduction to philosophical terminology and to ideas of ancient, medieval, and modern philosophers who have influenced present-day thought. (5F, Sp) Staff

111. (11) Ethics. Introductory study of major philosophies on the nature of the good of man, principles of evaluation, and moral knowledge. Special attention given to appeals to reason, human nature, moral law and happiness as standards in solving moral problems. (4F, W) Staff

112. (12) Social and Political Philosophy. Examination of ways in which leading philosophers have analyzed basic political, economic, and social issues, with emphasis on how these analyses relate to their wider philosophical systems. (4W) Staff

210. (50) Deductive Logic. Signs, symbols and language in human behavior. Detection of common fallacies, ambiguity, vagueness. Structure of propositions; forms of valid inference; nature of deductive systems, recognition of formal fallacies. (5F, W, Sp) Staff

211. (51) Inductive Logic. Analogical argument; Mill's methods and discovery of causes; framing and testing hypotheses in everyday life and in science; nature of evidence; right and wrong uses of statistics, probability. (2F) Staff

215. (13) Aesthetics. An introductory course exploring relations between philosophy and art; the reciprocal effect of aesthetic categories and metaphysical concepts; the nature of genius and creativity. (3W, Sp) Staff

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*Taught 1971-72.
**Taught 1972-73.

*310. (110) **History of Ancient Philosophy.** Development of philosophical thought in the ancient Greek world. Emphasizes reading from the pre-Socrates, Plato, Aristotle, the Stoics, and Epicureans. (4F) **Staff**

311. (111) **History of Medieval Philosophy. Neo-Platonism with stress on Plotinus, St. Augustine and early Christian philosophy. Early medieval thought. St. Thomas Aquinas and rise to scholasticism. Philosophic thought in the Renaissance. (4W) **Staff**

*312. (112) **History of Early Modern Philosophy.** European thought from the Renaissance through the 18th century, indicating the relationship of philosophic ideas to science, religion, logic, value theory, and theory of knowledge of Descartes, Hobbes, Spinoza, Leibnitz, Locke, Berkeley, Hume, and Kant. (4Sp) **Staff**

*313. (113) **History of Nineteenth - Century Philosophy.** European thought from Kant to Nietzsche, indicating the relationship of philosophic ideas to science, religion, and society. Readings in the metaphysics, value philosophy, logic, and theory of knowledge of such thinkers as Bentham, Mill, Comte, Hegel, Schopenhauer, Marx, and Nietzsche. (3W) **Staff**

315. (114) **Twentieth - Century Philosophy.** Readings and discussion of major philosophies of the 20th century, including philosophers from Bergson to Sartre. (3W) **Staff**

*316. (115) **History of American Philosophy.** Treats the main American philosophical levels and systems from Jonathan Edwards to John Dewey. (3Sp) **Staff**

*317. (116) **Philosophy of India.** A historical survey of Indian philosophy from Vedic times to the present, with special emphasis on critical analysis of various schools and systems of religious and philosophical thought which have influenced India and the Far East from time to time. (3Sp) **Staff**

318. (117) **Philosophies of the Far East. Survey of Chinese and Japanese philosophy from the early times to the present, analyzing features of Confucianism, Taoism, Buddhism, and Shintoism, including religious and philosophic thought in China under communism and post-war Japan. (3Sp) **Staff**

325. (172) **Philosophy of Science.** Assumptions and implications of scientific methods and findings: law, convention, determination, causality, truth, and value in the physical, biological, and social sciences. (3F) **Staff**

350. (176) **Philosophy of Religion.** Problems in defining "religion"; arguments for the existence of God; problems of moral and natural evil; arguments for the immortality of the soul; the nature of religious experience; the nature of faith; alternatives to theism; the nature of religious language. (3W) **Staff**

370. (167) **Existentialism. A description of fundamental structures of human existence, as revealed through phenomenological analysis and as they exist prior to theoretical accounts of them; an attempt to assess the significance of such knowledge for ethics, aethetics, epistemology, etc.; a consideration of how these existential programs were developed in the writing of Kierkegaard, Nietzsche, Husserl, Heidegger, Sartre and others. (3Sp) **Staff**

*410. (162) **Philosophy and Contemporary Social Problems.** Drawing upon concepts, theories, and analytical tools developed by philosophers: an attempt to locate, analyze, and project ways of constructively dealing with contemporary social problems such as world population, environmental pollution, civil disobedience, and personal privacy. (3F) **Staff**

411. (166) **Theories of Value.** Nature, kinds, criteria, and metaphysical status of value, with consideration of the relation between fact and value and the ways in which theories of value are involved in theories of human conduct. (3W) **Staff**

415. (177) **Philosophy of Law and Politics. An examination of various theories concerning the nature of law and politics, their purpose in society, and their relation to other practices and institutions; includes a consideration of how philosophical commitments underlie and affect actual legal and political practices. (3Sp) **Staff**

*501. (165) **Metaphysics.** Treats systematically the first cause of things. Such questions as what are the most real and less real things. Causality, space and time, idealism versus realism, universals, matter, essence and existence; the reality of mind, its qualities and role in the cosmos; the role of God. (3W) **Staff**

522. (161) **Symbolic Logic.** Deductive systems, valid and invalid arguments; logical paradoxes; sentenial calculus and introduction to predicate calculi. (5Sp) **Staff**

530. (168) **Theories of Knowledge.** Survey of classical problems in the theory of knowledge ranging from the problem of induction to the nature of sense data, emphasizing the use of modern techniques in clarifying classical epistemological issues. (3W) **Staff**

*531. (171) **The Concept of Mind.** Various theories of mind, and concepts of action and behavior as they relate to desire, belief, sensation, pain and perception. (3W) **Staff**

535. (174) **Philosophy of Education. An examination of philosophical thinking about education, its aims, methods, relations with

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*Taught 1971-72.
**Taught 1972-73.

other institutions, etc. Includes a consideration of how several philosophical traditions have influenced actual educational practices. (3F) **Staff**

560. (178) Philosophy of Art. A critical examination of the purpose, levels, and methods of criticism in the visual arts; a consideration of how philosophical (aesthetic) commitments underlie and affect actual instances of art criticism. (3Sp) **Staff**

****585. (173) Philosophy of Language.** Nature and uses of language. Concepts of meaning, reference, truth, name, syntax, semantics, pragmatics, metaphor, ambiguity, vagueness, definition. Applications in the fields of psychology, linguistics, anthropology, and literary criticism. (3F) **Staff**

599. (199) Readings and Research. The works of a particular philosopher or school of philosophy. Not more than five credits total may be earned by any student. Consent of instructor required. (F, W, Sp) **Staff**

Graduate

605. (205) Philosophy of History. Interpretations, causation, and interrelations in history. Cross-listed with History 605. (3F) **Staff**

609. (209) Philosophy of the Social Sciences. Critical examination of presuppositions, methods of inquiry and meaning of key concepts in the social sciences. Conceptual and methodological differences between social and natural sciences. (3F) **Staff**

699. (299) Independent Study. Research and writing in selected topics in Philosophy. Credit arranged. Not more than five credit total may be earned by any student. (F, W, Sp) **Staff**

*Taught 1971-72.
**Taught 1972-73.

*Department of

Manufacturing Engineering

Head: Professor Carl D. Spear
Office in Engineering L134

Professor Owen J. Shupe
Associate Professors G. Merrill Shaw, W. Karl Somers
Assistant Professor Don G. Ferney
Degrees: Bachelor of Science (BS), Master of Science (MS)
Major: Manufacturing Engineering

Manufacturing Engineering is a branch of Engineering in industry whose function is to plan the processes of economic manufacture, to specify or design the manufacturing tools and equipment, and to integrate the facilities required for producing given products with minimal expenditure of time, labor, and materials. Some typical responsibilities of manufacturing engineers are: to develop the manufacturing plan for each product so that it can be made with a minimum of time, labor, and materials; to interpret product designs for manufacturing, and inform product designers of production limitations and capabilities; to coordinate manufacturing proj-

*In College of Engineering.

ects so that products are delivered on schedule and within costs; to exploit new processes, materials and methods that lead to lower costs and a better product; to provide and allocate facilities so that the company maintains a competitive advantage.

Manufacturing engineers act as catalysts in today's industry, translating the exacting concepts of the product designer into reality. With the rapid development of new technology, the education of the manufacturing engineer takes on new importance.

National surveys indicate that increasing numbers of manufacturing engineers are needed. As industrial production expands in Utah and across the nation, opportunities will continue to increase.

The Manufacturing Engineering laboratories are all equipped with modern facilities for teaching, for engineering experimentation, and for student development in Manufacturing Engineering.

The department coordinates a program of summer employment for Junior students. This industrial experience greatly benefits the student in his understanding and application of the engineering concepts studied in classes. Field trips to industrial plants are conducted each year for Junior and Senior students.

The department is closely affiliated with the Society of Manufacturing Engineers. There is an active student chapter of the society on campus which promotes the professional and social interests of the Manufacturing Engineering students.

Undergraduate Study

The following curriculum leading to the Bachelor of Science degree in Manufacturing Engineering resulted in USU receiving the Society of Manufacturing Engineering 1965 National Education Award. This award connotes recognition and acceptance of the curriculum by the National Society.

Lower Division

Freshman and Sophomore courses follow the common Engineering curriculum listed in the College of Engineering introduction, p. 54.

Upper Division

JUNIOR YEAR

Courses	Credits F	W	Sp
Mfg Engrg 415, 416		3	3
Mfg Engrg 451, 452, 453	3	3	3
Mfg Engrg 461, 462, 454	2	2	3
Mfg Engrg 450, 481, 530	3	4	3
Civil Engrg 304	5		
Elec Engrg 405		3	
English 305	3		
Mfg Engrg 582			4
Totals	16	15	16

SENIOR YEAR

	F	W	Sp
Mfg Engrg 417, 575, 570	3	3	4
Mfg Engrg 535, 583	3	3	
Mfg Engrg 540, 545		2	3
Mfg Engrg 597, 598, 487	2	2	1
Civil Engrg 350, ME 330	3	3	
Elec Engrg 345			3
Humanities	6	4	6
Totals	17	17	17

Graduate Study

The graduate program in Manufacturing Engineering provides course work leading to the Master of Science degree. To meet individual interests, the graduate student may select one of three options to be taken along with the Manufacturing Engineering core. These options are: Engineering Administration, Manufacturing Systems Design, Applied Statistics-Computer Science. Gen-

eral requirements for the master's degree are:

1) To be accepted as a candidate an applicant must: a) hold a Bachelor of Science degree from an institution of recognized standing in one of the fields of Engineering or Physical Science, b) have had adequate preparation for graduate study in the chosen field of specialization, and c) show promise of doing well in advanced study as judged by previous scholastic record and other achievements.

2) The Master of Science curriculum must include at least 45 credits numbered 100 or above, with at least 10 credits in courses numbered 200 or above. A total of nine credits of acceptable graduate work may be transferred from another approved graduate school. A maximum of 18 credits may be taken at off-campus residence centers maintained by USU. A minimum of 15 credits, exclusive of thesis, must be completed on the Logan campus. Additional requirements, such as qualifying examination, final examination, time limit, etc., as outlined by the School of Graduate Studies, are included.

3) Selection of specific courses in the curriculum will be under advisement of a supervisory committee which is appointed by the dean of the Graduate School.

The candidate's program will include a selection of courses in the following areas:

	Credits
Mfg Engrg Core	21
Thesis	9
Minor—(option in Engineering Administration, Manufacturing Systems Design or Applied Statistics and Comuter Science) minimum	15
Total	45

An integrated program may be selected from the following courses:

Manufacturing Engineering Core:

Mathematics (Math 441, 442, 443)	9
Applied Statistics (Ap St 431, 432)	10
Computer Science (CS 380)	3
Value Engineering (Mfg E 630)	3
Metal Machining (Mfg E 651)	3
Methods Engineering (Mfg E 635)	3
Material Handling (Mfg E 645)	3
Special Problems (Mfg E 693)	3
Automation Systems (Mfg E 670)	3
Thesis (Mfg E 698)	9

Engineering Administration:

Production Management (BA 509)	4
Accounting for Management Control (Acct 501, 502)	6
Elem of Micro Econ Theory (Econ 300)	3
Managerial Economics (BA 635)	3
Administrative Control (BA 680)	3

Manufacturing Systems Designs:

Mechanical Analysis (ME 470)	4
Mechanical Design (ME 472)	4
Mechanical Design Projects (ME 693)	4
Dynamics of Machinery (ME 570)	4
Feedback Control (EE 554)	4
Advanced Mechanics of Materials (ME 504)	4
Dimensional Analysis and Similitude (CE 609)	4

Applied Statistics and Computer Science:

Computer Programming (CS 430, 440)	6
Industrial Statistics (Ap St 610)	3
Operations Research (CS 645, 646)	6

Manufacturing Engineering Courses

Undergraduate

305. (137) Work Simplification and Layout. Management techniques with emphasis on methods improvement, time study analysis, plant layout and material handling procedures, particularly adapted to Business Administration majors. (4W) **Staff**

315. (150) Engineering Metallurgy. Physical properties, composition, constituents, and heat treatment of metals and metal alloys. Material specifications, tests, and places of applications in industry. Prerequisite: Chemistry 111. Three lectures, one lab. (4F, Sp) **Staff**

415. (140) Material Science. An introductory course dealing with the structure of material substances and the relations between structures and the engineering properties of materials. Includes crystal structures of metals, alloys and ceramic phases; structures of noncrystalline solids such as glasses and cements;

imperfections in crystals; phase diagrams. Prerequisites: Chemistry 114, 115. Three lectures. (3W) **Shupe**

416. (141) Physical Metallurgy. Structure, and properties of metals and alloys with examples of their relation to manufacturing practices. Prerequisite: Mfg Engrg 415. Two lectures and one three-hour lab a week. (3Sp) **Spear**

417. (142) Ceramic and Plastic Materials. Special emphasis on crystal structures and interatomic bonding. Separate attention given to mechanical, thermal, electrical, and magnetic properties of these materials. (3F) **Spear**

450. (148) Manufacturing Processes. Possibilities and limitation of processes and their application to fabrication of industrial products. (3F, Sp) **Staff**

451. (151) Manufacturing Operations-Fundamentals. The study and analysis of metal machining operation as applied to basic production machines. Emphasis is placed on understanding the capability and versatile usefulness of the machines. Prerequisite: Mfg Engrg 461 taken concurrently. (3F) **Somers**

452. (152) Manufacturing Operations-Machining Theory. Theory of metal machining including an analysis of the factors involved in obtaining the optimum conditions for metal removal and surface finish. Prerequisites: Mfg Engrg 416, 451, 461, concurrently Mfg Engrg 462. (3W) **Somers**

453. (153) Principles of Numerical Control. Fundamental concepts, analysis for economic justification and optimum utilization, and programming for numerical control equipment. Prerequisite: Mfg Engrg 452. Two lectures, one lab. (3Sp) **Somers**

454. (154) Manufacturing Analysis. Analysis of product design for economical production sequence and the preparation of cost estimate form standard time data. Selection of optimum production tooling and processing equipment. One lecture, two labs. (3Sp) **Staff**

461, 462. (161, 162) Manufacturing Processes Laboratory. Analysis and verification of metal machining fundamentals and theory. Emphasis is placed on the analysis of the parameters involved for efficient utilization of manufacturing equipment. Prerequisites: Concurrently Mfg Engrg 451, 452. (2F, W) **Somers**

481. (181) Manufacturing Design. Fundamental concepts used in manufacturing industries to represent design information. Working drawings, dimensioning, tolerancing, design standards, cutting tool design, and gauge design. Two lectures, two labs. Prerequisite: Mfg Engrg 451. (4W) **Ferney**

487. (184) Senior Seminar. A review of current technical literature dealing with the latest production methods. Oral and written reports presented for discussion. (1Sp) **Staff**

493. (173) Special Problems - Undergraduate. Comprehensive report required. Prerequisite: Senior classification and permission of the department head. (3F, W, Sp) **Staff**

497. (197) Honors Studies. Work is initiated by the student and may consist of a special individual project under the direction of a faculty member, or of advanced study in connection with an established departmental course. Prerequisites: A satisfactory grade point average, recommendation of instructor and approval of the College of Engineering Honors Committee. 1-3 credits arranged. (F, W, Sp) **Staff**

530. (157) Quality Control. Quality control systems in manufacturing; dimensional and statistical systems are emphasized. Prerequisites: Mech Engrg 220, Mfg Engrg 452. (3Sp) **Staff**

535. (158) Manufacturing Economy. Engineering economy principles and facilities. Economic selection of alternative designs, materials, and methods; interest, depreciation, valuation, risk, replacement, minimum cost and break-even factors. Prerequisites: Mfg Engrg 450, 454, Economics 200. (3F) **Ferney**

540. (180) Methods Engineering. Design and measurement of work methods; basic principles of motion economy as applied to tool design, workplace layout and factory facilities. An introduction to methods design problems. (2W) **Staff**

545. (183) Plant Layout. Utilization of space, machines, materials, handling methods and equipment for economical production. Organization and planning details for layout of production facilities. Prerequisites: Mfg Engrg 450, 540. Two lectures, one lab. (3Sp) **Shaw**

570. (134) Fundamentals of Machine Design. Application of principles of mechanics, strength of materials and kinematics to the design of basic machine elements. Force and stress analysis. Introduction to general design of major machine members; fastenings, power transmitting devices, shafts, bearings, gearing. Prerequisite: Civil Engrg 304. Three lectures, one lab. (4Sp) **Ferney**

575. (144) Applied Hydraulics and Pneumatics. Fluid power and control systems as applied to machine tools. Prerequisite: Civil Engrg 350. Two lectures, one lab. (3W) **Staff**

582. (182) Production Tool Design. Analysis and design of production tooling such as jigs and fixtures. Topics covered will include pre-design analysis, cutting force analysis, principles of locating and positioning, and

mechanics of clamping devices. Two lectures, two labs. Prerequisites: Mfg Engrg 453, Civil Engrg 304. (4W) **Somers**

597, 598. (187, 188) Senior Project. Each student is assigned a manufacturing problem involving design, development, construction, and testing. A formal technical report is required. (2F, W) **Staff**

670. (190) Automation Systems. Basic theories and hardware of feedback control systems. Electro-mechanical, hydraulic and pneumatic components and systems. Prerequisites: Elec Engrg 405, Math 324. Three lectures and labs. (3Sp) **Staff**

Graduate

583. (282) Advanced Production Design. Analysis and design of production tooling for products fabricated by press working methods. Topics covered will include the application and theory of metal cutting, bending, drawing, forging, and extruding. Two lectures, one lab. Prerequisite: Mfg Engrg 582. (3S) **Somers**

615. (240) Advanced Material Science. Theoretical aspects of materials: structure of crystalline and non-crystalline materials; phase equilibria; surfaces and interfaces; imperfection and flow of matter. A quantitative treatment of material properties. Prerequisite: Instructor's consent. Three lectures. (3W) **Spear**

630. (258) Value Engineering. Principles and techniques of value analysis and engineering as applied to all phases of manufacturing. Organization requirements for an effective value system. Effective techniques for completing engineering staff work. Prerequisite: Mfg Engrg 535. Three lectures. (3F) **Staff**

635. (280) Methods Engineering. Work measurement methods; the application of work simplification methods in industrial organizations. Prerequisite: Mfg Engrg 540. Two lectures, one lab. (3W) **Staff**

645. (283) Material Handling. Analysis of material handling problems, selection of material handling equipment, and problems in the design of integrated handling systems. Prerequisite: Mfg Engrg 540 or instructor's consent. (3Sp) **Staff**

650. (248) Advanced Manufacturing Processes. A study of the non-traditional material removal and forming processes. Emphasis is given to the economic aspects of the processes as well as to the theory, application, and implementation. Prerequisite: Mfg Engrg 450 or instructor's consent. (3W) **Somers**

651. (251) Metal Machining. Accelerated study of metal machining concepts including basic machine tool operations, cutting tool geometry, cutting metallurgy and machinability, machining economics, process capability studies for dimensional conformance, mechanics of chip formation, cutting dynamometry, and grinding principles. Prerequisite: Graduate status in Engineering. Two lectures, one lab. (3W) **Somers**

680. (287) Manufacturing Seminar. Students prepare technical papers on suitable topics and present to Manufacturing Engineering staff and graduate students. Two lectures. (1F, W, Sp) **Spear**

693. (273) Special Problems in Manufacturing Engineering. Independent or group study of engineering problems not covered in regular course offerings. Time and credit arranged. **Staff**

698. (298) Graduate Thesis. Credit arranged. (F, W, Sp, Su) **Staff**

699. (400) Continuing Graduate Advisement. Credit arranged. (F, W, Sp, Su) **Staff**

*Department of

Mathematics

Head: Associate Professor Lawrence O. Cannon
Assistant Head: Professor Joe Elich
Office in Engineering C-325

Professors Neville C. Hunsaker, Konrad Suprunowicz

Associate Professors Robert W. Gunderson, Robert Hammond, L. Duane Loveland, Mary Nelson, Wayne Rich, Eugene E. Underwood, Joseph E. Valentine, Stanley G. Wayment

Assistant Professors Antone Bringhurst, John R. Edwards, Barbara Price, Douglas F. Riddle, James D. Watson

Degrees: Bachelor of Science (BS), Master of Science (MS), Master of Mathematics (MM)

Majors: Mathematics, Mathematics Teaching

The Department of Mathematics offers a variety of courses designed to prepare students for careers in teaching or for positions as mathematicians in industry or governmental agencies. The department also provides service courses for many other groups of students.

Placement of New Students. The American College Testing battery, which includes a test in Mathematics, is given to all Freshman students prior to or at the time of registration. The results of this test, along with other pertinent information, are used as a basis for placing incoming Freshman students in the proper course of Mathematics. Students who score below a prescribed minimum are required to enroll in Math 1 or Math 2. Any student who intends to take Math 220 (or a higher level Mathematics course) will be placed in Math 101, 105, 106, or 220 (or a higher level course) depending on his test score and previous training in Mathematics. Math 105 and 106 are designed specifically to prepare students for Math 220. Freshmen who have completed three or four years of high school mathematics, including a study of trigonometric functions, should normally qualify for Math 220.

Any student who does not plan to take additional mathematics, but who wishes to use a Mathematics course to fulfill the University requirements, should take Math 130. If a student completes both Math 130 and 101 credit will be allowed for only one of these courses.

Transfer students are urged to consult with advisers in the Mathematics Department for proper placement.

Undergraduate Study

Two majors are offered for the Bachelor of Science degree:

1) **Regular Major in Mathematics.** The regular major is designed for students who intend to enter graduate study in Mathematics (including those who plan to teach Mathematics at the junior college or university level), and for those who wish to prepare for

*In College of Science.

employment as mathematicians in industry or in governmental agencies. Regular majors are required to complete Math 324, 421, 422, 423 and 15 additional credits of upper division Mathematics selected from courses 345, 427, 428, 441, 442, 443, 446, 491, 531, 532, 533, 536, 537, 551, 552, 553, 561, 562, 563, 571, 572, 573, 591. Physics 221, 222, and 223 are required, and nine credits of upper division Physics are recommended. Those students planning to study Mathematics at the graduate level should include at least one of the sequences Math 531, 536, 537; or 531, 532, 533; or 551, 552, 553. They should also have a reading knowledge of French, German, or Russian.

Regular Minor. The recommended minor in Mathematics includes satisfactory completion of Math 223 and nine additional credits in Mathematics courses which require Math 223 as a prerequisite.

2) **Teaching Major.** Those students who plan to teach Mathematics in the secondary schools must satisfy the state requirements for secondary certification and must complete departmental requirements in one of two ways: a) regular Mathematics major, b) a department-approved teaching major which includes Math 222, 305, 306, 307, 309, 311, 411, and an additional 11 credits of upper division Mathematics selected from courses meeting departmental approval. (With special permission of his adviser a student may substitute Math 531, 532, 533 for Math 305, 306, 307 in this requirement.)

An "application for admission to teacher education" should ordinarily be completed before the Junior year (see College of Education requirements). Approval is prerequisite to teacher certification candidacy and to enrollment in Education and Psychology courses.

Teaching Minor. A department-approved teaching minor must include Math 221 and 309. It must also include Math 305 and 311 or department-approved substitutes. Other details concerning teaching major and minor requirements are described in the document *Teaching Majors and Minors for Secondary School Teachers*, distributed by the Department of Secondary Education.

Students majoring in Elementary Education can select a minor in Mathematics. Details are described in a document issued by the Department of Elementary Education.

All courses to be used as prerequisites must be completed with a grade of "C" or better.

Graduate Study

The Department of Mathematics offers two graduate degrees: Master of Science and Master of Mathematics. The MS degree prepares a student for further graduate study in Mathematics, for a position in industry or a government agency, or for teaching in a junior college or a four-year college. The MM degree is intended for those who plan to teach Mathematics at a junior college or at a high school which offers advanced placement courses in Mathematics. See the Graduate School Catalog for prerequisites and further information.

Mathematics Courses

Undergraduate

1. (new) Remedial Mathematics. A non-credit course for those students shown by the placement test to need a review of basic arithmetic. (F, W)[1] **Staff**

2. (new) Remedial Algebra. A non-credit course in elementary algebra for those students requiring preparation for mathematics courses carrying college credit. (F, W, Sp)[1] **Staff**

101. (34) Introduction to College Algebra. Beginning algebra designed to develop skill and techniques of elementary algebra. In most cases, students with more than one year of high school algebra should not enroll in Math 101. Prerequisite[1] (3F, W, Sp) **Staff**

105. (35) College Algebra. Real numbering system, equations and inequalities, functions, logarithms, polynomials, mathematical induction binomial theorem, determinants and matrices. Prerequisites.[1] (5F, W, Sp) **Staff**

106. (36) Plane Trigonometry. Trigonometric functions, identities, and solution of triangles. prerequisite.[1] (3F, W, Sp) **Staff**

130. (30) Elements of Mathematics. A survey course designed to help fulfill the science group requirements for students who are not planning to study more mathematics. Prerequisite: One year of high school algebra. (5F, W, Sp) **Staff**

201, 202. (21, 22) Mathematics for Elementary Teachers. (3F, W, Sp) **Staff**

220, 221, 222, 223. (96, 97, 98, 99) Analytic Geometry and Calculus. Analytic geometry in two and three dimensions together with elementary calculus including partial derivatives, multiple integrals and infinite series. Prerequisite.[1] (5F, 5W, 5Sp) **Staff**

241. (60) Mathematics of Finance. Prerequisite: Math 105 or high school equivalent. (3F, W, Sp) **Staff**

242. (66) Introduction to Mathematical Analysis. Calculus and an introduction to linear analysis. Primarily for students not in the physical or engineering sciences. Prerequisite: Math 105 or high school equivalent. (5F, W, Sp) **Staff**

****271. (40) Introduction to Probability Theory and Statistics.** A pre-calculus course in elementary probability theory and a brief introduction to statistics. Prerequisite: Math 105. (3Sp) **Staff**

303. (103) Geometry for Elementary Teachers. Prerequisite: Math 202. (3W, Sp) **Staff**

305, 306, 307. (150, 151, 152). Mathematics for Teachers. Basic concepts of mathematics for prospective secondary school teachers with emphasis on mathematical systems and the systems of real numbers. Prerequisite: Math 105. (3F, 3W, 3Sp) **Staff**

309. (175) Methods of Secondary School Mathematics. A methods course required of all prospective secondary school teachers. Prerequisite: Math 305. (3Sp) **Staff**

311. (120) Modern Geometry. An axiomatic development of Euclidean and non-Euclidean geometries. Prerequisite: Math 221. (3W) **Staff**

321. (110) Ordinary Differential Equations. Elementary techniques used in finding solutions to ordinary differential equations. Prerequisite: Math 223. (3F, W, Sp) **Staff**

341. (112) Engineering Analysis. Practical applications of differential equations, vector analysis, and Fourier Series to the analysis of electrical, mechanical, and physical systems in engineering. Prerequisite: Math 324. (3F, W,)[2] **Staff**

342. (113) Engineering Analysis. Practical application of techniques of matrix and determinant theory and complex functions to the analysis of electrical, mechanical, and physical systems in engineering. Prerequisite: Math 324. (3F)[2] **Staff**

343. (114) Engineering Analysis. Practical applications from the theory of probability and statistics to the analysis of electrical, mechanical, and physical systems in engineering. Prerequisite: Math 324. (3Sp)[2] **Staff**

345. (145) Vector Analysis. The algebra and calculus of vectors. Prerequisite: Math 223. (3Sp) **Staff**

384. (123) Number Theory. Elementary properties of integers, some arithmetical functions, congruences, and simple Diophantine equations. Prerequisite: Math 221. (3Sp) **Staff**

387. (124) Foundations of Mathematics. Introduction to elementary set theory and a study of axiomatic systems in general. Prerequisite: Math 221. (3W) **Staff**

391. (153) Readings and Conferences. For prospective secondary school teachers. Credit arranged. (F, W, Sp) **Staff**

421, 422, 423. (130, 131, 132) Advanced Calculus. Elementary theory of functions of real variables. Prerequisite: Math 223. (4F, 4W, 4Sp) **Staff**

427, 428. (147, 148) Introduction to Complex Variables. A first course in complex variables designed for Physics and Engineering students, and as a prerequisite for Math 624. Prerequisite: Math 223. (3F, 3W) **Staff**

441. (140) Introductory Linear Analysis. Topics from linear algebra including matrix and vector analysis, linear transformations and characteristic value problems, with emphasis on techniques for applications. Prerequisite: Math 223. (3F, W,) **Staff**

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[1]See paragraph on page 262 describing "Placement of New Students."

**Taught 1972-73.

[2]Not to be taken for graduate credit.

442, 443. (141, 142) Advanced Engineering Mathematics. Differential equations and boundary value problems, Fourier series, Laplace transforms and linear systems. Emphasis is on techniques used in applications. Prerequisites: Math 324, 441. (3W, 3Sp) **Staff**

446. (111) Ordinary Differential Equations. Existence theorems, systems of linear differential equations. Fourier series and boundary value problems, Laplace transforms. Prerequisite: Math 324. (3Sp) **Staff**

491. (153) Readings and Conferences. Credit arranged. (F, W, Sp) **Staff**

511, 512. Metric Development of Geometry. Fundamental concepts of abstract metric spaces leading to a systematic development of hyperbolic and euclidean geometries from metric space postulates. Prerequisites: Math 421, Math 441 is desirable. (3W, 3Sp) **Staff**

521, 522, 523. (new) Advanced Calculus B. For graduate students deficient in analysis. Prerequisite: Math 223. (3F, 3W, 3Sp) **Staff**

531. (116) Modern Algebra. Introduction to theory of groups. Prerequisite: Math 223. (3F) **Staff**

532, 533. (117, 118) Modern Algebra. Introduction to rings, integral domains, vector spaces and fields. Prerequisite: Math 531. (3W, 3Sp) **Staff**

536, 537. (164, 165) Linear Algebra. Finite dimensional vector spaces, linear transformations, matrices, characteristic values and vectors, diagnolization theorems, bilinear forms. Prerequisite: Math 223. (3W, 3Sp) **Staff**

551, 552, 553. (134, 135, 136) Introduction to Topology. Elementary point set topology. Prerequisite: Math 223. (3F, 3W, 3Sp) **Staff**

561. (126) Numerical Methods. Survey of numerical methods used in finding zeros of functions, solutions of systems of equations, and curve fitting. Prerequisites: Math 223 and a knowledge of FORTRAN. (3F) **Staff**

562. (127) Introduction to Numerical Analysis. Numerical solution of differential equations including initial value problems for systems of equations using single and multi-step methods. Solution of two-point boundary value problems and the associated algebraic systems. Prerequisites: Math 324, 441. (3W) **Staff**

563. (128) Introduction to Numerical Analysis. Solution of algebraic system of equations, inversion of matrices and determination of eigen values and eigen vectors. Prerequisite: Math 441. (3Sp) **Staff**

571. (161) Theory of Probability. Prerequisite: Math 223. (5F) **Staff**

572, 573. (162, 163) Mathematical Statistics. Including Math 571, year's sequence in mathematical theory of probability (including a study of discrete and absolutely continuous distributions), elementary sampling theory and hypothesis testing. Prerequisites: Math 441, 571. (5W, 5Sp) **Staff**

591. (153) Readings and Conferences. Credit arranged. (F, W, Sp) **Staff**

611. (246) Topics in Geometry. Prerequisite: Math 345. (3F) **Staff**

612, 613. (247, 248) Topics in Geometry. Prerequisite: Math 611. (3W, 3Sp) **Staff**

621, 622, 623. (251, 252, 253) Real Analysis. Prerequisite: Math 423. (3F, 3W, 3Sp) **Staff**

624, 625, 626. (254, 255, 256) Complex Analysis. Prerequisite: Math 423. (3F, 3W, 3Sp) **Staff**

631, 632, 633. (216, 217, 218) Topics in Abstract Algebra. Prerequisite: Math 533. (3F, 3W, 3Sp) **Staff**

637, 638, 639. (220, 221, 222) Advanced Topics in Algebra. Prerequisites: Math 631, 632, 633. (3F, 3W, 3Sp) **Staff**

641, 642, 643. (252, 258, 259) Topics in Applied Mathematics. Prerequisite: Math 423. (3F, 3W, 3Sp) **Staff**

647, 648, 649. (237, 238, 239) Mathematical Physics. Prerequisite: Math 423 or 443. (3F, 3W, 3Sp) **Staff**

651, 652, 653. (234, 235, 236) Topology. Prerequisite: Math 423. (3F, 3W, 3Sp) **Staff**

661, 662, 663. (226, 227, 228) Numerical Analysis. Prerequisite: 423, 563. (3F, 3W, 3Sp) **Staff**

680. (250) Graduate Seminar. Credit arranged. (F, W, Sp) **Staff**

697. (260) Graduate Thesis. Credit arranged. (F, W, Sp) **Staff**

698. (new) Research Consultation. Credit arranged. (F ,W, Sp) **Staff**

699. (400) Continuing Registration. Credit arranged. (F, W, Sp) **Staff**

*Department of

Mechanical Engineering

(Aerospace Engineering and Pre-Chemical Engineering)

Head: Associate Professor Russell M. Holdredge

Office in Engineering L180

Professors Owen K. Shupe, Reynold K. Watkins

Associate Professors J. Clair Batty, Alma P. Moser, Edward W. Vendell

Assistant Professors P. Tom Blotter, Albert B. Smith, Dan H. Swenson

Degrees: Bachelor of Science (BS), Master of Science (MS), Doctor of Philosophy (PhD)

Major: Mechanical Engineering

Mechanical Engineering is the development of energy and the machines and systems which utilize it. Engineering firms, industries, utilities, many government agencies, and research foundations require mechanical engineers in areas such as: aeronautics, automotive engineering, nuclear engineering, petroleum engineering, industrial engineering, space engineering, thermodynamics, heat transfer, machine design, power production, system engineering, management, equipment sales, refrigeration, air conditioning, etc.

Limited specialization in these areas can be achieved in the undergraduate technical elective program in the Senior year, but most firms prefer that additional specialization be obtained in industry or on a graduate level. Consequently, undergraduate emphasis is on basic engineering fundamentals such as mathematics, chemistry, physics, engineering sciences, and their application.

*In College of Engineering.

Undergraduate Study

Lower Division. Freshman and Sophomore common Engineering curriculum is listed in the College of Engineering introduction, p. 54.

The following curriculum leading to the BS degree in Mechanical Engineering is accredited by Engineers' Council for Professional Development.

Upper Division

JUNIOR YEAR

Courses	Credits F	W	Sp
Mech Engrg 330, 331, 332	3	3	3
Civil Engrg 304	5		3
Elec Engrg 405			3
Civil Engrg 350, 351	3	3	
Mech Engrg 370, 335, 336	3	3	4
Math 341	3		
Mech Engrg 402		4	
[1]Humanities/Social Sci		3	5
Totals	17	16	15

SENIOR YEAR

Courses	F	W	Sp
Mech Engrg 470, 471, 472	4	4	4
Elec Engrg 345		3	
Mech Engrg 487	1	1	1

[1]See College of Engineering for details.

Mech Engrg 415, 416		3	3
[1]Humanities/Social Sci	5	3	
[2]Approved Electives	6	3	6
Totals	16	17	14

Chemical Engineering Curriculum

A two-year, pre-Chemical Engineering curriculum is offered by the department. Interested students should check with the department concerning details of the program since it does deviate slightly from the two-year common core curriculum in Engineering.

Graduate Study

The advanced degree programs afford the student the opportunity for in-depth or broad multi-discipline study. The exact graduate curriculum is tailored to meet the needs of each student. Typical degree programs are in applied mechanics, materials, fluid mechanics, nuclear engineering, energy conversion, propulsion, thermodynamics, and heat transfer. Examples of multi-discipline programs are electro-mechanical engineering, food engineering, systems design, and engineering administration. For additional details concerning general requirements, see the graduate catalog. For questions about specific requirements and programs contact the department.

Forty-five credits beyond the bachelor's degree are required for the Master of Science degree in Mechanical Engineering. Nine credits of Mathematics are required beyond that required for a BS degree.

Following is a typical course of study leading to the Master of Science degree in Mechanical Engineering.

Courses	Credits F	W	Sp	Su
Math 441, 442, 443	3	3	3	
Mech Engrg 604, 605, 602	3	3	3	
Mech Engrg 635, 654	3	3		
Mech Engrg 630	3			
Specialization		3	6	
Thesis				9
Totals	12	12	12	9

Mechanical Engineering Courses

Undergraduate

Note: Do not purchase drafting instruments before first class in Engineering Graphics.

120. (120) Engineering Measurements. Basic engineering measurements, theory and techniques; error analysis, data reduction and rejection; analysis of data by graphical, statistical, and mathematical means; experiment planning. Prerequisite: Math 105. Three lectures, one lab. (4F, W, Sp, Su) **Watkins**

170. (21) Engineering Graphics. Development of spatial visualization. Graphical solutions involving points, lines, and planes. One lecture, two labs. (3F, W, Sp) **Smith**

200. (new) Engineering Mechanics, Statics. See Civil Engrg 200.

202. (new) Engineering Mechanics, Dynamics. See Civil Engrg 202.

304. (new) Mechanics of Solids. See Civil Engrg 304.

330. (111) Thermodynamics. Introductory topics in statistical and classical thermodynamics with an emphasis on subjects of interest to civil, electrical, manufacturing, and mechanical engineers. Prerequisite: Concurrent registration or passing grade in Math 324. Three lectures. (3F, W) **Batty, Vendell**

331. (112) Thermodynamics. Introductory topics in statistical and classical thermodynamics with an emphasis on subjects of interest to civil and mechanical engineers. Prerequisite: Mech Engrg 330. Three lectures. (3W, Sp) **Batty, Vendell**

[1]See College of Engineering for details of group requirements.

[2]Electives may be selected from the following courses. English 305 (or Speech 305), Mech Engineering 502, 504, 520, 545, 547, 548, 554, and 560-565. Other elective selections which offer in-depth coverage or unique programs may be acceptable; however, prior approval is required.

332. (113) Thermodynamics. Topics in classical and statistical thermodynamics with an emphasis on mechanical engineering applications. Prerequisite: Mech Engrg 331. Three lectures. (3Sp) **Batty, Vendell**

335, 336, (116, 117) Heat and Mass Transfer. Conduction (diffusion), convective transfer, radiation, applications and laboratory tests. Prerequisites: Mech Engrg 330, Math 341, and Civil Engrg 350. Three lectures and one lab. (3W, 4Sp) **Batty, Holdredge**

340. (136) Food Engineering. Basic engineering concepts and their application to the food industry. Introductory topics in thermodynamics. Definitions, nomenclature, conservation of mass, first and second laws of thermodynamics, pschrometrics, simple power and refrigeration cycles. Prerequisites: Math 105, Physics 212. Three lectures. (3W) **Batty**

341. (137) Food Engineering. Continuation of the study of basic engineering concepts and their application to the food industry. Introductory concepts in fluid mechanics and heat transfer will be introduced. Engineering measurement techniques are presented in the laboratory. 2 lectures, one lab. (3Sp) **Batty**

370. (22) Graphical Design Methods. Graphical solutions, vector graphics, graphs and graphical mathematics. Prerequisite: Mech Engrg 170. One lecture, two labs. (3W) **Smith**

402. (161) Dynamics, Intermediate. Displacement, velocity, and acceleration. Motion of a particle, motion of a system of particles, moving reference frames, motion of a rigid body; Euler's equations, Hamilton's principle, Lagrange's equations. Prerequisites: Civil Engrg 202 and Math 341. Three lectures, one lecture-laboratory. (4W) **Blotter, Moser**

415, 416. (150, 151) Material Science. Solid state physics related to engineering properties of metals, alloys, ceramics, plastics, and composites. Prerequisites: Physics 223, Chem 122. Three lectures. (3W, 3Sp) **Shupe**

470, 471, 472. (131, 132, 133) Engineering Design. (4F, 4W, 4Sp) **Blotter**

487. (198) Senior Seminar. Selected topics of interest to mechanical engineers are presented and discussed by members of the class and specially qualified visitors. Prerequisite: Senior standing in Mechanical Engineering. Two lectures. (1F, W, Sp) **Shupe**

493. (199) Special Problems. Formulation and solution of theoretical or practical problems. Comprehensive report required. Prerequisites: Senior classification and permission of head of department. (3F, W, Sp) **Staff**

497. (197) Honors Studies. Work is initiated by a student and may consist of a special individual project under the direction of a faculty member, or of advanced study in connection with an established departmental course. Prerequisites: A satisfactory grade point average, recommendation of instructor, and approval of the College of Engineering Honors Committee. (1-3 F, W, S) **Holdredge**

Advanced Upper Division

(Graduate credit allowed for departmental majors)

502. (162) Mechanical Vibrations. Free, damped and forced linear vibrations of systems with one and two degrees of freedom. Transient and nonperiodic vibrations. Introduction to analog techniques. Applications. Prerequisite: Mech Engrg 402 or instructor's consent. Three lectures. (3F) **Blotter, Moser**

504. (165) Mechanics of Solids, Intermediate. Development of various theories of failure and stress-strain relationships as they apply to problems of direct and shearing loads, flexure, and torsion; with special application to thick-walled cylinders, discs, curved beams, unsymmetrically and eccentrically loaded members; and photoelastic analysis. Prerequisites: Math 324, Civil Engrg 304. Three lectures. (3W) **Moser**

506. (new) Limit Analysis of Structures. See Civil Engrg 506.

520. (121) Engineering Instrumentation. Theory of engineering instrumentation and measurements including the gathering, manipulation, transmission and recording of data. Equal emphasis on hardware and techniques. Prerequisite: Mech Engrg 120. Two lectures, one lecture-lab. (3W) **Blotter**

545. (183) Thermal Environmental Engineering. (3W) **Staff**

547. (187) Propulsion Systems. Analysis of the thermodynamic cycles used in air-breathing propulsion systems for piston, turbine and ram-jet engines. Prerequisite: Mech Engrg 332. Two lectures, one lecture-lab. (3Sp) **Vendell**

548. (185) Thermodynamics of Engines. Thermodynamic analysis of heat engine cycles with an emphasis on internal and external combustion engines. Additional topics include: fuels and combustion, lubricants, exhaust-gas analysis, and air pollution. Prerequisite: Instructor's consent. Two lectures, one lecture-lab. (3Sp) **Vendell**

554. (143) Gas Dynamics. Isentropic flow, shock waves, constant area flow, flow with heating, generalized one-dimensional flow.

Prerequisites: Mech Engrg 331, Civil Engrg 351. Two lectures, one lecture-lab. (3F) **Vendell**

560, 561, 562. (190, 191, 192) Nuclear Engineering. Atomic and nuclear theory; nuclear reactions and radiations; nuclear reactor theory; reactor instrumentation and control; radiation monitoring and safety; radiation shielding; reactor fuels and fuel processing; thermal aspects of reactors; type of reactors. Three lectures. (3F, 3W, 3Sp) **Shupe**

563, 564, 565. (193, 194, 195) Nuclear Laboratory. May be taken concurrently with Mech Engrg 560, 561, 562. One lab. (1F, 1W, 1Sp) **Shupe**

Graduate Courses

In many cases a graduate student may meet the intent of a prerequisite for a graduate class (due to experience or other course work) without formally completing the listed prerequisites. Please check with the individual instructors for questions concerning prerequisites.

601. (new) Structural Matrix Analysis. See Civil Engrg 601.

602. (261) Mechanical Vibrations, Advanced. Normal modes and material frequencies by matrix methods. Non-linear systems. Analysis of transverse, longitudinal, torsional, and flexural vibrations in continuous elastic media. Prerequisite: Mech Engrg 502. Three lectures. (3Sp) **Blotter**

604. (166) Continuum Mechanics. Introduction and application of tensors as applied to the mechanics of solid or fluid continua. Relations between stress, strain, and strain rate; for anisotropic and isotropic elastic, plastic, and viscous solids; and for compressible viscous fluids. Prerequisite: Civil Engrg 304. Three lectures. (3F) **Moser**

605. (205) Elastic Theory. Interrelationship of stresses and/or strains, properties of the material, and configuration of an elastic media under a given load. Prerequisite: Mech Engrg 604. Three lectures. (3W) **Moser**

606. (202) Plasticity Theory. Analysis of stresses, deformation, and collapse in devices constructed of plastic material. Prerequisite: Mech Engrg 604. Three lectures. (3F) **Blotter, Moser**

608. (new) Elastic Stability. See Civil Engrg 608.

609. (new) Similitude. See Civil Engrg 609.

615. (251) Material Science, Advanced. Three lectures. **Shupe**

630. (211) Thermodynamics, Advanced. Intermediate topics in classical and statistical thermodynamics with an emphasis on engineering applications. Prerequisite: Instructor's consent. Three lectures. (3F) **Batty, Vendelll**

631. (212) Thermodynamics, Advanced. Intermediate and advanced topics in classical and statistical thermodynamics with an emphasis on engineering applications. Prerequisite: Mech Engrg 630. Three lectures. (3W) **Batty, Vendell**

635. (210) Transport Phenomena. Systematic and parallel treatment of momentum transfer (viscous flow), heat transfer, and mass transfer. Prerequisites: Mech Engrg 336 and 604 concurrently. Three lectures. (3F) **Holdredge**

636, 637, 638. (216, 217, 218) Heat and Mass Transfer, Advanced. Advanced topics concerning mass transfer and heat transfer by conduction, convection, and radiation. Prerequisites: Mech Engrg 635 (for Mech Engrg 636 only), 336. Three lectures. (3W, 3Sp, 3Su) **Holdredge**

642, 643, 644. (new) Applied Plasmadynamics. See Elec Engrg 642, 643, 644.

651. (new) Hydraulic Transients. See Civil Engrg 651.

653. (new) Advanced Fluid Mechanics Lab and Instrumentation. See Civil Engrg 653.

654, 655, 656. (240, 241, 242) Gas Dynamics, Advanced. Topics in gas dynamics designed to: 1) enable the student to understand current research literature on gas dynamics and the relevant sciences, 2) acquaint the student with general features of the types of gas flows encountered in today's technology. Prerequisites: Mech Engrg 554. Three lectures. (3W, 3Sp) **Batty, Vendell**

660, 661, 662. (290, 291, 292) Nuclear Reactor Engineering. Transport theory and neutron diffusion; homogeneous reactors with and without reflector; heterogeneous reactors; reactor materials; design, operation, and control of nuclear reactors; reactor kinetics. Three lectures. (3F, 3W, 3Sp) **Shupe**

670. (230) Kinematics, Advanced. Review of vector analysis; analytical methods; complex numbers and their application in kinematic analysis and synthesis; geometry of contrained motion; the Euler-Savary equation; Hartmann's construction; Block synthesis; Freudenstein's theorem; the Hrones-Nelson synthesis of the four-bar linkage; the analysis of space mechanism. Prerequisite: Mech Engrg 402. Three lectures. (3Sp) **Eisenstein**

693. (273) Special Problems. Independent or group study of engineering problems not covered in regular course offerings. Time and credit arranged. (F, W, Sp) **Staff**

697. (298) Thesis Research. Credit arranged. (F, W, Sp, Su) **Staff**

699. (400) Continuing Registration. Credit arranged. F, W, Sp, Su) **Staff**

702. (262) Mechanical Vibrations, Advanced. Continuation of 602. Three lectures. (3F) **Blotter**

705. (206) Elastic Theory. Continuation of 605; elementary problems in three dimensions; two-dimensional problems solved by Airys stress function; complex variables and conformal mapping as applied to elasticity problems; and other advanced techniques. Prerequisite: Mech Engrg 605. Three lectures. (3Sp) **Moser**

708. (new) Plate Theory. See Civil Engrg 708.

709. (new) Shell Theory. See Civil Engrg 709.

753. (new) Numerical Methods in Fluid Mechanics. See Civil Engrg 753.

757. (new) Fluid Mechanics, Advanced. See Civil Engrg 757.

759. (new) Fluid Mechanics, Advanced. See CE 759.

793. (new) Special Problems. Independent or group study of engineering problems not covered in regular course offerings. Time and credit arranged. (F, W, Sp) **Staff**

797. (298) Dissertation Research. Credit arranged. (F, W, Sp, Su) **Staff**

799. (400) Continuing Registration. Credit arranged. (F, W, Sp, Su) **Staff**

**Department of*

Military Science

University ROTC Coordinator: Professor Edwin L. Peterson

Head: Professor Colonel Joseph A. Gappa, Jr., Infantry

Office in Military Science 102

Assistant Professors Lieutenant Colonel Gene L. Moosman, Quartermaster Corps; Major Donald R. Saari, Armor; Major Kenneth S. Freeman, Ordnance Corps; Captain Earl M. Yamada, Infantry; Captain Ronald C. Cheatham, Ordnance Corps

The purpose of Army ROTC is to develop reserve officers in sufficient quantity to provide a nucleus of well-educated leaders for an army that would have to expand rapidly in the event of a national emergency. The program produces Second Lieutenants for the Active Army and the Army Reserve. A limited number of Distinguished Military Graduates annually are offered commissions in the Regular Army.

To be eligible for a commission as a Reserve Second Lieutenant a student must not have reached his 28th birthday prior to appointment. If he is commissioned in the Army Reserve and unless he has completed flight training, he will be required to serve two years on active duty. If he participates in flight training, he must serve for three years on active duty following completion of commissioned status basic course and flight training of approximately 12 months.

The Army ROTC offers a two-year and a four-year program. The four-year program consists of a Basic Course and an Advanced

*In College of Business.

Course. The Basic Course is normally taken during the Freshman and Sophomore years. During the Freshman year, two alternatives are available to the student to complete the Military Science instruction. The instruction may be taken each quarter throughout the academic year (MS 102, 103, and 104, and associated leadership laboratory periods), or the instruction is offered as a "compressed course" during either Fall or Spring Quarters (MS 101 and the associated leadership laboratory period). The Advanced Course is normally taken during the Junior and Senior years, and consists of six quarters of work plus an advanced summer camp (between the Junior and Senior years).

The two-year program is designed primarily for students who transfer to the University from another institution where ROTC was not offered, to include junior colleges, or for those students at Utah State University who are unable to take the Army ROTC four-year program because of scheduling difficulties. Graduate and other students who could not or did not elect to take the four-year program are eligible provided that they meet certain physical, age, and remaining time requirements. This is a program which is highly competitive, and entrance is on a selective basis. Selected students attend a six-week basic summer camp prior to acceptance in the Advanced Course.

After completion of the two-year Basic Course or the basic summer camp and selection for further training, cadets may enroll in the Advanced Course, subject to any quota limitations. Under the provisions of the contract between the University and the Department of the Army, the University agrees to require that each student who enrolls will complete the course as a prerequisite to his graduation. Therefore, if he enrolls in the Advanced Course, he must complete that course unless relieved of this obligation by regulations prescribed by the Secretary of the Army. Signing of an ROTC deferment agreement while a Basic Course student obligates the student to elect enrollment in the Advanced Course if he is selected for it.

Enrollment Regulations. Leadership laboratory is an integral part of the ROTC program. Enrollment in leadership laboratory is required of all ROTC students.

An activity fee of $5 is required of all ROTC students and is paid at the time of initial enrollment each year. This fee is not refundable after the withdrawal date for any school quarter.

General Requirements

A) Basic Course: Be a regularly enrolled student at USU and meet certain educational, citizenship, age, physical, and character requirements.

B) Two-Year Program:

1) Attend and complete a six-week basic summer camp.

2) Have two academic years remaining after completion of basic summer camp.

C) Advanced Course:

1) Satisfactorily complete the Basic Course or have equivalent credit. Equivalent credit consists of active duty for training for a minimum of four months. PMS approval of waiver for the Basic Course, or a portion thereof, is required.

2) Accept and sign an ROTC deferment agreement and agree

to stipulations of the Advanced Course contract, outlining the obligations of both the student and the service.

3) Have high moral character.

4) Obtain a satisfactory score on the Army Qualification Test.

5) Be selected for enrollment into the Advanced Course by a selection board composed of officers and civilian faculty members. Selection is based on academic standing, previous ROTC grades, scores in the tests, moral character, leadership, and officer potential.

6) Have sufficient time remaining in school to complete ROTC. It is desirable, but not required, that a student complete the ROTC program and the requirements for a degree simultaneously. For selection into the Advanced Course, a student normally must have at least six quarters of undergraduate or graduate schooling remaining.

7) Any student who is selected for, and enrolled in, the Advanced Course of Army ROTC will enlist in the United States Army Reserve. The ROTC Advanced Course student, although a member of the Army Reserve, will not attend any meetings other than his regular ROTC classes.

The Advanced Course student will also sign a contract with the United States Army agreeing to serve on active duty as a commissioned officer for the period specified by law (two years as a Reserve Officer, three years as a Regular Army Officer).

Academic Course Substitutes

Recognizing the modern Army leader's need for certain training to prepare him for broad responsibilities while in the military service, the Army has authorized substitution of certain academic University courses in lieu of some ROTC classroom instruction. These are not additionally required courses but, in effect, ones granting "dual credit" — they fill requirements for a major and meet requisites for ROTC training leading to a commission.

During enrollment in the Basic Course, cadets must complete English 101, 102, and 103. During the first three and one-half years of enrollment in the University, Advanced Course cadets must complete one of the following Political Science courses: PS 440, 210, 441, 581, 540, 542, 533, 541, 536, 521, 525, 522, 583, 526, 523, 527, 528, 105.

Army ROTC Flight Training

This training is offered to selected Army ROTC students who meet physical standards for flying. Instruction is so arranged that it will not interfere with ROTC or regular academic schedules. For acceptance in the course, students must either be enrolled in MS IV ROTC or have successfully completed MS IV, but not have completed the academic requirements for graduation or commissioning. The flight program consists of 71½ hours of training: 35 hours of ground instruction and 36½ hours of actual flight instruction. Completion of this training will qualify a student for a FAA private pilot's license. All training is conducted by FAA-approved instructors. If interested in participating in flight training, see the Military Science class adviser for further information.

Summer Camp

Advanced ROTC cadets must participate in a six-week advanced summer camp held at Fort Lewis, Washington. Attendance is re-

quired between the Junior and Senior years unless a subsequent period is specifically approved by the Commanding General, Sixth United States Army. Practical application of classroom theory and living in the field make it an interesting and stimulating experience. The utilization of the basic summer camp for entry into the advanced course has been discussed previously in connection with the Army ROTC two-year program.

Both the Basic and Advanced Summer Camps are listed for six credits. Grading is on a "pass-fail" basis.

Students who follow the two-year course and attend the six-week basic summer camp will be paid at the same rate as an Army Private plus travel pay to and from camp.

Payment to Advanced Cadets

Upon enrollment in the Advanced Course, students will enlist in the Army Reserve and will receive a substantial monthly subsistence allowance for a period not to exceed twenty months. They will further receive a travel allowance to and from the advanced summer camp. While at the advanced summer camp the student will be paid at a rate equivalent to one-half the base pay of an Army Second Lieutenant. Upon entrance into active duty, the cadet will receive a $300 uniform allowance.

Military Science Major

A major in Military Science is offered by the Military Science Department. This major is intended to serve two categories: service personnel stationed at near-by military installations who desire to complete a degree while in the service, and college students interested in the possibility of making a career of the service. The latter who elect this major are required to complete a dual major, the purpose of which is to assure adequate preparation for the future in the event they are not selected or cannot qualify for a reserve commission. Further, it is not possible for a student to qualify for a major in Military Science if he fails to be selected for Advanced ROTC.

Regular Commissions in the United States Army

Each year outstanding Army ROTC cadets who have demonstrated a high degree of leadership, initiative, and desire for a career as a Regular Army Officer are designated Distinguished Military Graduates and are offered an opportunity to apply for a Regular Army Commission.

Delay of Entry on Active Duty

An Army ROTC student may have one year after completion of the ROTC Advanced Course to complete requirements for his bachelor's degree and to be commissioned. To accommodate his desires for graduate schooling following commissioning in the USAR, he may apply for delayed entry on active duty. The U.S. Army may delay call to active duty one year at a time up to four years providing the applicant shows acceptance by an accredited Graduate School and maintains requirements for retention in Graduate School. Application for delayed entry must be submitted 120 days prior to commissioning. In special cases, where more than four years are required for a doctor's degree, additional delay time may be granted by Department of the Army.

Texts and Uniforms

All texts and uniforms are furnished at no expense to the student.

Pershing Rifles

The National Society of Pershing Rifles was formed "to foster a spirit of friendship and cooperation among men in the Military Departments." Company "G," 9th Regiment, is located at USU. Membership in Pershing Rifles is open to any Army or Air Force basic or advanced cadet.

The Pershing Rifles is essentially an organization designed for those students who have special interest in tactical operations. The emphasis is placed on field training and maneuvers.

Honor Guard

The Honor Guard, offered within the scope of Pershing Rifles Drill, is a highly trained organization consisting of eighteen regular and three alternate members. This unit participates in parades, ceremonies, exhibitions, and drill competition. It provides color guards for various ceremonies both on and off campus. Membership is determined following intra-ROTC competition among interested cadets during Fall Quarter.

University Rifle Team

The Army ROTC Detachment provides instruction in rifle marksmanship and sponsors the USU Rifle Team. Enrollment is open to any regularly enrolled student, both male and female. Activities include postal and invitational match competition. This course, which counts one credit, is also within the scope of Pershing Rifles Drill for enrollment purposes.

Pershing Rifle Courses

111, 112, 113. (37, 38, 39) Pershing Rifle Drill, Freshmen. (1F, 1W, 1Sp) **Staff**

211, 212, 213. (40, 41, 42) Pershing Rifle Drill, Sophomores. (1F, 1W, 1Sp) **Staff**

311, 312, 313. (137, 138, 139) Pershing Rifle Drill, Juniors. (1F, 1W, 1Sp) **Staff**

411, 412, 413. (147, 148, 149) Pershing Rifle Drill, Seniors. (1F, 1W, 1Sp) **Staff**

Sponsor Corps

Sponsor Corps is a quasi-military organization composed of 40 coeds chosen for the Corps by the Sponsor Staff, with final selection being made by a board of judges. The purpose of the Sponsor Corps is to provide official hostess and ushering service for the University, to perform as drill units in a variety of exhibitions, and to assist the ROTC Department in furthering their aims of military interest on campus.

Sponsor Corps Courses

121, 122, 123. (51, 52, 53) Sponsors Drill, Freshmen. A course in leadership organization and drill for women elected to Corps of Sponsors. (1F, 1W, 1Sp) **Freeman**

221, 222, 223. (54, 55, 56) Sponsors Drill, Sophomores. (1F, 1W, 1Sp) **Freeman**

321, 322, 323. (151, 152, 153) Sponsors Drill, Juniors. (1F, 1W, 1Sp) **Freeman**

421, 422, 423. (154, 155, 156) Sponsors Drill, Seniors. (1F, 1W, 1Sp) **Freeman**

Military Science Courses

Basic Courses

MS I — First Year Basic

Director: Maj. Ken S. Freeman

101. (11) Basic Cadet Orientation. History and organization of the Army; leadership, drill and command. One class period and one leadership laboratory period per week. (2F) **Freeman**

102. (12) Evolution of Weapons and Warfare. History, mission, and organization of the Army; leadership, drill and command. One class period and one leadership laboratory per week. (2W) **Freeman**

103. (13) Organization for National Security. National security; leadership, drill and command. One class period and one leadership laboratory per week. (2Sp) **Freeman**

104. (10) U.S. Defense Establishment. Leadership drill and command. Three class periods and one leadership laboratory period per week. (5F, Sp) **Freeman**

MS II — Second Year Basic
Director: Maj. Donald R. Saari

201. (21) Leadership in Military Operations. Operations and tactics; leadership, drill and command. Two class periods and one leadership laboratory period each week. (3F) **Saari**

202. (22) American Military History. Leadership, drill and command. Two class periods and one leadership laboratory period each week. (3W) **Saari**

203. (23) Map and Aerial Photograph Interpretation. Leadership, drill and command. Two class periods and one leadership laboratory period each week. (3Sp) **Saari**

304. (25) Basic Summer Camp. Attendance at the basic summer camp is required for all applicants for the two-year program. Practical training for six weeks at a regular Army post prior to enrollment in the Advanced Course. (6Su)

Advanced Courses

MS III — First Year Advanced
Director: Cpt. Earl M. Yamada

301. (131) Leadership; military teaching methods; drill and command; physical training. Two class periods per week and one leadership laboratory period per week. (3F) **Yamada**

302. (132) Small unit tactics; counterinsurgency; leadership, drill and command. Two class periods and one leadership laboratory period per week. (3W) **Yamada**

303. (133) Signal communications; organization; mission and function of arms and services; leadership drill and command. Two class periods and one leadership laboratory period each week. (3Sp) **Yamada**

305. (150) Advanced Summer Camp. Attendance at summer camp is required of all Advanced Course students. Practical training for six weeks at a regular Army post subsequent to completion of Military Science III. (6Su) **Yamada**

MS IV — Second Year Advanced
Director: Lt. Col. Gene Moosman

401. (141) Unit logistics and administration; leadership, drill and command. Two class periods and one leadership laboratory period each week. (3F) **Moosmon**

402. (142) Command and staff; organization for operations; military team. Two class periods and one two-hour leadership seminar each week. Time of seminar to be arranged between cadet and director. (3W) **Moosman**

403. (143) Military law; service orientation; leadership, drill and command. Two class periods and one leadership laboratory period each week. (3Sp) **Moosman**

404. (145) Army ROTC Flight. An FAA-approved standardized flight program of instruction consisting of 35 hours of ground instruction and 36½ hours of flight instruction. The student must be enrolled in MS IV or have completed MS IV but must not have completed academic requirements for a degree or appointment. (3F, W, Sp) **Saari**

Seminars

205. (174) Advanced Military Science Seminar Problems. Credit arranged. (F, W, Sp, Su) **Staff**

405. (201) Advanced Military Science Seminar Problems. Credit arranged. (F, W, Sp, Su) **Staff**

*Department of

Music

Head: Professor Max F. Dalby
Office in Fine Arts Center 107

Professors Alma L. Dittmer, Ralph Matesky, Irving Wassermann
Associate Professors Warren Burton, William Ramsey, Alvin Wardle
Assistant Professors Glen Fifield, Stephen Simmons, Larry G. Smith
Lecturer Betty Matesky
Visiting Instructors Parley Belnap, Eugene Foster, Dennis Griffin, Ruth Helm, Barbara Miller
Degrees: Bachelor of Arts (BA), Bachelor of Music (BM), Master of Arts (MA), Master of Music (MM)
Majors: Music Education, Applied Music, Music Theory

The Department of Music serves three functions: 1) provides courses that meet lower division and general education requirements in Humanities and Arts; 2) provides courses to increase understanding and appreciation of music and to develop particular skills; 3) offers specific sequences of courses to students desiring professional preparation in music education, applied music, and music theory.

The general purpose of the program in music for the Music major is three-fold: 1) to prepare certified music teachers to serve effectively in vocal and instrumental music positions in public school systems; 2) to prepare talented vocalists, pianists, and players of string and wind instruments for careers as professional performers and teachers; 3) to prepare gifted students for graduate study in music theory and composition.

*In College of Humanities, Arts and Social Sciences.

[1]Other electives are permitted when proficiency is demonstrated. Music 104 (Beginning Theory) may be taken in place of Music 102.

[2]Music 102 is a recommended prerequisite to Music 350.

Music Majors

Baccalaureate degrees in music may be earned with a composite major in Music Education, Applied Music, and Music Theory. The curriculum for a major in Music Education leads to the Bachelor of Arts or the Bachelor of Music degree. The curriculum for a major in Applied Music or Theory leads to a Bachelor of Arts degree. To obtain the Bachelor of Arts degree, the foreign language requirement must be fulfilled.

All Music majors are expected to attend concerts, recitals, and lyceums.

Music Minors

ACADEMIC

Courses	Credits
Music 102 or 104 Fundamentals of Music or Beginning Theory	3-5
301 Music History and Literature	3
302 Music History and Literature	3
303 Music History and Literature	3
Ensemble Performance	4-6
	18

TEACHING, ELEMENTARY SCHOOLS

Music 101 Introduction to Music	3
[1]102 Fundamentals of Music	3
[1]180 Group or Individual Piano Instruction	3
181 Group Vocal Instruction	1

340 Choral Conducting	3
[2]350 Music for Elementary Schools	3
Major Performance Group	5
	21

TEACHING, SECONDARY SCHOOLS

Music 101 Introduction to Music	3
102 Fundamentals of Music	3
181 Group Vocal and/or Individual Instruction	3
340 Choral Conducting	3
[2]349 Gen Music in the Secondary Schools	3
[4]180 Group Piano or Individual Instruction	3
Major Performance Group	6
	24

Degree in Music Education

An "application for admission to teacher education" should ordinarily be completed before the Junior year (see College of Education requirements). Approval is a prerequisite to teacher certification candidacy and to enrollment in Education and Psychology courses.

Degree in Music Education with Wind or String Instrument Emphasis

Courses	Credits
Music 104, 105, 106 Theory (beginning)	15
304, 305 Theory (advanced)	6
306 Form and Analysis	3
301, 302, 303 Music History and Literature	9
340 Choral Conducting	3
341 Instrumental Conducting	3
351 Secondary School Choral Methods and Materials	3
353 Secondary School Instrumental Methods and Materials	3
507 Scoring and Arranging	3
180 Group Piano (or proficiency)	3
181 Group Voice	1
182 Group Woodwinds (flute, clarinet, low single reeds, double reeds)	4
183 Group Brass (cornet, horn, trombone, baritone-tuba)	4
184 Group Strings (violin-viola, cello, bass)	3
185 Group Percussion	1
[5]Individual Instruction	6
Major Performance Group	6
A recital appearance is required each quarter	
	76

[2]This program is directed primarily toward the preparation of teachers of general music on the junior high level.

[4]Other electives are permited when proficiency is demonstrated.

[5]Required two years or competency plus one year on minor instrument. Participation in two major performing groups is required.

Degree in Music Education with Vocal Emphasis

Music 104, 105, 106 Theory (beginning)	15
304, 305 Theory (advanced)	6
306 Form and Analysis	3
301, 302, 303 Music History and Literature	9
135, 335 Opera Workshop	3
338 Readings in Choral Literature	2
340 Choral Conducting	3
341 Instrumental Conducting	3
349, 350 Music for Secondary Schools or Music for Elementary Schools	3
351 Secondary School Choral Methods and Materials	3
356 Vocal Pedagogy	2
357 Vocal Repertory	2
180, 160, 360 Group or Individual Piano Instruction	3-6
382 Woodwind Practicum	2
390 Brass and Percussion Practicum	2
507 Scoring and Arranging	3
Individual Instruction	6
Major Performance Group	3
A recital appearance is required each quarter.	
	73-76

Degree in Music Education with Piano Emphasis

Music 104, 105, 106 Theory (beginning)	15
304, 305 Theory (advanced)	6
306 Form and Analysis	3
301, 302, 303 Music History and Literature	9
340 Choral Conducting	3
341 Instrumental Conducting	3
349, 350 Music for Secondary Schools or Music for Elementary Schools	3
351 Secondary School Choral Methods and Materials	3
507 Scoring and Arranging	3
164, 364 Individual Vocal Instruction	3
338 Readings in Choral Literature	3
177, 178, 179 Piano Literature	6
160, 360 Individual Piano Instruction	9
Group Instrumental Instruction	6
Ensemble Performance (Choral and/or Instrumental)	6
A recital appearance is required each quarter.	
	78-81

Degree in Applied Music

Applied Music majors should demonstrate outstanding competence vocally or instrumentally during their Freshman and Sophomore years. They must pass a

minimum proficiency examination in piano, and should be able to sight read simple piano accompaniments. (All vocal majors are required to develop grade 4 level of piano proficiency.) Students with extensive background in piano performance may choose to pass this requirement by special examination in lieu of taking courses. All Applied Music majors are required to take weekly half-hour private lessons during their Freshman and Sophomore years, and one-hour lessons during their Junior and Senior years. Each Applied Music major shall give an individual graduation recital during his Senior year and each must participate in a performing organization every quarter during each year of study.

Core

Music 104, 105, 106 Theory (beginning)	15
304, 305 Theory (advanced)	6
306 Form and Analysis	3
301, 302, 303 Music History and Literature	9
340, 341 Choral or Instrumental Conducting	3
507 Scoring and Arranging	3
Foreign Language	24
	63

Vocal Major

	63
Music 356 Vocal Pedagogy	2
357 Vocal Repertory	2
338 Readings in Choral Literature	2
135, 335 Opera Workshop	6
164, 364 Individual Vocal Instruction	12
	87

Piano Major

	63
Music 177, 178, 179 Piano Literature	6
142, 342 Piano Ensemble	6
355 Piano Teaching Methods	1
160, 360 Individual Piano Instruction	12-18
	88-92

String Major

	63
Music 143 String Ensemble	3
184 Group String Instruction	3
Individual Instruction	12-18
Ensemble Performance	6
	87-93

Wind Major

	63
Music 144, 145 Ensemble Participation	3
382 Woodwind Practicum	2
390 Brass and Percussion Practicum	2
Individual Instruction	12-18
Major Performance Group	6
	88-94

An information manual, available from the Music Department, gives recommended sequences of courses for all Applied Music and Music Education majors for each of the four years.

Degree in Theory

Music 104, 105, 106 Theory (beginning)	15
304, 305 Theory (advanced)	6
306 Form and Analysis	3
301, 302, 303 Music History and Literature	9
507 Scoring and Arranging	3
508, 509, 510 Counterpoint	9
514, 515, 516 Composition	9
601 Introduction to Musicology	3
Private Instruction (piano and/or organ)	6
Ensemble Performance	6
Foreign Language	24
	93

It is recommended that each student in Applied Music or Theory complete 25 credits in either German or French, or 15 credits in each.

Graduate Study

Qualified graduates from accredited degree-granting institutions in Music may be admitted as candidates for graduate degrees in Music.

Each candidate must successfully complete an examination for admission to the program of graduate study in music. This examination may be taken under the supervision of a proctor at a college or school designated by the University Department of Music and near the candidate's place of residence.

Two different degrees are offered: Master of Music and Mas-

ter of Arts. The Master of Arts degree requires two years of foreign language study. For each degree, the student may select courses of study leading to a Major in Music Education or a Major in Applied Music.

Students may elect a thesis project or a lecture-recital. All work is to be completed under the supervision of a graduate committee. In addition, each student is required to take the Graduate Record Examination before being admitted to candidacy for the master's degree.

Before being admitted as a candidate, a singer must show acquaintance with solo literature for his voice. His repertory must include: 1) representative solos for his voice from standard oratorios; 2) representative arias for his voice from standard operas; 3) standard and contemporary solo repertory from Italian, French, German, and American sources.

Degree in Music Education

Music 601 Introduction to Musicology	3
680 Seminar in Music Education	3
681 Seminar in Music Theory	3
682 Seminar in Music Literature	3
687 Individual Recital or Thesis (697)	9
Ed 660 Historical and Philosophical Foundations of Education	3
Ed 615 Foundations of Curriculum Development	3
Psych 666 Principles of Learning and Teaching	3
	30

Supporting Minor Area

(Electives 15 credits)

Music 508, 509, 510 Counterpoint	3-9
514, 515, 516 Composition	3-9
349 Music for Secondary Schools	3
605 Special Problems	3-6
612 Twentieth-Century Music	3
651 Advanced Choral Methods	1
652 Advanced Orchestra Methods	1
654 Teaching Stringed Instruments	3
655 Band Symposium	3
Individual Instruction	3
	45

Degree in Applied Music

Music 601 Introduction to Musicology	3
605 Special Problems	6
612 Twentieth-Century Music	3
680 Seminar in Music Education	3
681 Seminar in Music Theory	3
682 Seminar in Music Literature	3
687 Individual Recital	9
Individual Instruction	6
Major Performance Group	3
	39

Supporting Minor Area

(Electives six credits)

Music 598, 509, 510 Counterpoint	3-9
514, 515 516 Composition	3-9
349 Music for Secondary Schools	3
605 Special Problems	3-6
612 Twentieth-Century Music	3
651 Advanced Choral Methods	1
652 Advanced Orchestra Methods	1
654 Teaching Stringed Instruments	3
655 Band Symposium	3
Individual Instruction	3
	45

The Doctor of Education degree in Curriculum Development and Supervision with a special emphasis in Music Education is also available. Details concerning this degree may be obtained from the Graduate School or College of Education.

Music Courses

Undergraduate

101. (1) Introduction to Music. A non-technical course planned to develop understanding and enjoyment of music through hearing and studying selected composition in all musical forms. (3F, W, Sp, Su) **Burton, Staff**

102. (2) Music Fundamentals. Scales, intervals, keys, rhythms, meters, terminology for both visual and aural perception. Designed primarily for non-music majors and elementary school teachers. (3F, W, Sp, Su) **Staff**

104, 105, 106. (4, 5, 6) Beginning Theory. Includes sight-singing, ear training, rhythmic readings, melody and harmony writing and keyboard harmony. Required of Music majors. (5F, W, Sp, Su) **Smith**

124, 324. (24, 124) Chamber Orchestra. Preparation and performance of music for chamber orchestra and opera. May be repeated for credit. Admission by audition. (1F, W, Sp) **R. Matesky**

125, 325 (25, 125) University Orchestra. Experience in performing a wide range of orchestral works, including symphonies and major choral works. May be repeated for credit. Attendance required at all public appearances. (2F, W, Sp) **R. Matesky**

126, 326. (26, 126) Concert Band. A training band for students who wish to qualify for membership in the University Symphonic Band. Provides experience for Music majors in rehearsal techniques, conducting, and playing minor instruments. Practical study of literature for use in the public schools. May be repeated for credit. (1W, Sp) **Wardle, Staff**

127, 327. (27, 127) University Band. Rehearsals and drills for presentation of shows for football games. Study and preparation of symphonic band literature for concert performance. Attendance required at all public appearances. Enrollment Winter and Spring by audition only. May be repeated for credit. (2F, W, Sp) **Dalby, Staff**

130, 330. (30, 130) Jazz Ensemble. Preparation and performance of popular and jazz music. Admission by audition. May be repeated for credit. (1F, W, Sp) **Smith**

133, 333. (33, 133) University Choir. Rehearsal and public performance of significant choral literature with emphasis on oratorio and larger forms with orchestral accompaniment. Attendance required at all public appearances. May be repeated for credit. (1F, W, Sp) **Simmons**

135. (35) Opera Workshop. Musico-dramatic techniques for the beginning singer and coach. Study of easy scenes, one-act operas and secondary roles in larger productions. Opportunity to participate in major productions. Admission by audition. (1-3Su) **Simmons, Staff**

142, 342. (42, 142) Piano Ensemble. Works for two pianos and for piano, four hands. Training in sight-reading; developing ensemble playing ability. Admission by audition. Four students per section. May be repeated for credit. (1F, W, Sp, Su) **Wassermann**

143, 343. (43, 143) String Ensemble. Offers opportunities for capable string players and pianists to form trios, quartets, and other small ensembles. May be repeated for credit. (1F, W, Sp) **R. Matesky**

144, 344. (44, 144) Brass Ensemble. Brass quartets, sextets, and larger groups. Members are selected from applicants. May be repeated for credit. (1F, W, Sp) **Fifield, Wardle**

145, 345. (45, 145) Woodwind Ensemble. A study of literature for woodwind quintet and other small groups. May be repeated for credit. (1F, W, Sp) **Dalby, Staff**

160, 360. (60, 160) Individual Piano Instruction. Credit arranged. (F, W, Sp, Su) **Wassermann, Staff**

161, 361. (61, 161) Individual Viola Instruction. Credit arranged. (F, W, Sp, Su) **R. Matesky, Staff**

162, 362. (62, 162) Individual Organ Instruction. Credit arranged. (F, W, Sp, Su) **Belnap**

164, 364. (64, 164) Individual Vocal Instruction. Credit arranged. (F, W, Sp, Su) **Dittmer, Ramsey, Simmons, Staff**

170, 370. (70, 170) Individual Woodwind Instruction. Credit arranged. (F, W, Sp, Su) **Dalby, Foster, Smith**

172, 372. (72, 172) Individual Brass Instruction. Credit arranged. (F, W, Sp, Su) **Fifield, Wardle**

173, 373. (73, 173) Individual Percussion Instruction. Credit arranged. (F, W, Sp, Su) **Griffin**

174, 374. (74, 174) Individual Violin Instruction. Credit arranged. (F, W, Sp, Su) **R. Matesky, Staff**

175, 375. (75, 175) Individual Cello Instuction. Credit arranged. (F, W, Sp, Su) **Burton**

176, 376. (76, 176) Individual String Bass Instruction. Credit arranged. (F, W, Sp, Su) **Staff**

177, 178, 179. (77, 78, 79) Piano Literature. A listening course designed to present piano music for the general student as well as the trained musician. Fall quarter covers the period to baroque and rococo; Winter Quarter, classicism and early romanticism; Spring Quarter, late romanticism, twentieth century, and American music. (2F, W, Sp) **Wassermann**

180. (80) Group Piano Instruction. For Music majors, Music minors, and Elementary Education majors only. Open to a limited number of other students. Permission of B. Matesky required. (1F, W, Sp) **Helm, B. Matesky**

181. (81) Group Vocal Instruction. (1F, W, Sp) **Simmons**

182. (82) Group Woodwind Instruction. a) flute, b) clarinet, c) low single reeds, d) double reeds. (1F, W, Sp) **Dalby, Smith, Wardle**

183. (83) Group Brass Instruction. a) cornet, b) trombone, c) baritone-bass, d) horn. (1F, W, Sp) **Fifield, Wardle**

184. (84) Group String Instruction. a) violin-viola, b) cello, c) bass. (1F, W, Sp) **R. Matesky**

185. (85) Group Brass Instruction. (1F) **Fifield, Wardle**

301, 302, 303. (101, 102, 103) Music History and Literature. Basic course for Music majors and those desiring a comprehensive background in music. Stresses music in general culture, the place of music in history, and the relationship of music to the other arts. Fall Quarter covers the period from antiquity through the baroque; Winter Quarter, classicism and romanticism; Spring Quarter, contemporary music. Required of all Music majors. Prerequisite: Music 102 or 106. (3F, W, Sp) **Wassermann**

304, 305 (104, 105) Advanced Theory. Continuation of Beginning Theory. Includes advanced sight-singing, keyboard modulation, and introductory counterpoint. (3F, W) **Dittmer**

306. (106) Form and Analysis. Harmonic, melodic and rhythmical analysis of musical forms. (3Sp) **Dittmer**

329. (129) Stage Band Workshop. Practicum for Music and Music Education majors; study of the contemporary idiom of the high school dance band; analysis of harmonic structure and ear training in chordal progressions and improvisation. Prerequisite: Music 306. (3Sp) **Smith**

334. (134) Chamber Choir. A select mixed concert chorus performing a wide range of choral literature. Attendance required at all public appearances. Admittance by invitation only. (1F, W, Sp) **Ramsey**

335. (135) Opera Staging and Production. Musical and theatrical techniques for the singing actor, pianist-coach, and music-theatre director. Audition required for singers and pianists. (1-3 Su) **Simmons, Staff**

336. (136) University Chorale. A select mixed concert chorus performing a wide range of choral literature. Attendance required at all public appearances. Admission by audition. May be repeated for credit. (2F, W, Sp) **Ramsey**

338. (138) Readings in Choral Literature. Provides an opportunity for majors in Music Education with the vocal concentrate to become familiar with materials suitable for performance by high school choral groups. (2Sp) **Ramsey**

339. (139) Women's Chorus. Rehearsal and performance of significant literature for women's voices. Attendance required at all public appearances. May be repeated for credit. (1F, W, Sp) **Dittmer**

340. (140) Choral Conducting. Fundamentals of baton technique and interpretation of the musical score. Assigned projects in conducting small and large vocal ensembles. (3F) **Ramsey**

341. (141) Instrumental Conducting. Basic rehearsal procedures for realization of musical values. Assigned projects in conducting small and large instrumental ensembles. (3W) **Dalby, Staff**

346. (146) Percussion Ensemble. A study of literature for percussion ensemble and preparation for public performance. (1F, W, Sp) **Griffin**

349. (149) Music for the Secondary Schools. A study of the music program for the non-specializing teen-ager, dealing with his emotional and vocal problems, and with methods for introducing singing, playing musical instruments, hearing, reading, and creating music. (3W) **Dittmer**

350. (150) Music for the Elementary Schools. Problems, methods, and materials in singing, rhythms, creative music, readings, and listening. (3F, W, Sp, Su) **Burton, Fifield**

351. (151) Secondary School Choral Methods and Materials. (3W) **Ramsey**

353. (153) Secondary School Instrumental Methods and Materials. (3Sp) **Dalby, Staff**

355. (155) Piano Teaching Methods. Designed to prepare qualified pianists to teach piano effectively, and to acquaint them with new materials and techniques. Problems common to all piano teaching and teacher-student relationships are analyzed. (1Sp) **Wassermann**

356. (156) Vocal Pedagogy. Technical, scientific, and practical problems encountered by teachers of singing. (2F) **Ramsey**

357. (157) Vocal Repertory. A study of English, Italian, and French vocal literature, as well as German lied and contemporary song literature, through performances; concentration is on diction, interpretation, and style. (2W) **Ramsey**

363. (163) Piano Workshop. An intensive course for advanced piano students and piano teachers. Includes lectures on basic harmony, piano techniques, memorization, building repertoire, and teaching materials. (1Su) **Wassermann**

382. (182) Woodwind Practicum. The concepts and techniques fundamental to correct playing of the woodwind instruments commonly used in school bands and in orchestras. Designed primarily for vocal, string, and piano candidates in Music Education. (2F) **Dalby, Staff**

384. (184) String Pedagogy. For qualified string players whose interest is primarily in teaching stringed instruments individually and in classes. Careful study of materials and teaching techniques via actual teaching experiences with young children assigned by the staff to each member of the class. Seminars in teaching, and discussion of teaching

performances by class members, evaluation by class and staff of teaching procedures and materials used in teaching demonstrations. Candidates may be admitted only after personal consultation. (2F, W, Sp)
Burton, R. Matesky, Miller

390. (190) Brass and Percussion Practicum. Concepts and techniques fundamental to correct playing of the brass and percussion instruments commonly used in school bands and orchestras. Designed primarily for vocal, string, and piano candidates in Music Education. (2W) **Fifield, Wardle**

507. (107) Scoring and Arranging. Theoretical and practical study of scoring for wind, string, and percussion instruments in various combinations, ranging from small ensembles to the Concert Band and Symphony Orchestra. (3W) **Smith**

508, 509, 510. (108, 109, 110) Counterpoint. Strict counterpoint in all species in two, three, and four or more parts. Creative writing. Combined forms; double and triple with three parts. (3F, W, Sp) **Dittmer**

514, 515, 516. (114, 115, 116) Composition. Projects in creative composition in the smaller forms, including solo and ensemble compositions. Prerequisites: Music 306, 507. (3F, W, Sp) **Dittmer**

Graduate

601. (201) Introduction to Musicology. Systematic and historical fields of musical knowledge and research. (3F, Su) **Wardle, Staff**

605. (205) Special Problems in Music. An advanced course designed to meet specific problems of the music educator and the applied music specialist. (1-3F, W, Sp, Su) **Staff**

612. (212) Twentieth-Century Music. An intensive survey of significant techniques, forms and styles in the music of our times. Analysis of a variety of scores and recordings. Works of criticism evaluating recent developments and statements by composers discussing their philosophy and aims. Prerequisite: Music 102 or equivalent. (3W, Su)
Wassermann

635. (235) Advanced Opera Workshop. Designed for the advanced singer, conductor-coach, and director. Directors will be assigned scenes and one-act operas to direct. Conductor-coaches will prepare and perform scenes and assist with major productions. Advanced singers will perform leading roles in major productions. Admission by audition. (1-3F, W, Sp, Su) **Simmons, Staff**

651. (251) Advanced Choral Methods. Rehearsal techniques and materials for the secondary school choir. Study of phonetics as it relates to the choral sound. Teachers registering for this class are expected to sing in the clinic chorus. Daily during Summer Music Clinic. (1Su) **Staff**

652. (252) Advanced Orchestra Methods. Techniques in training the school orchestra. Teachers registering for this class are expected to play in the clinic orchestra. Daily during Summer Music Clinic. (1Su) **Staff**

654. (254) Teaching Stringed Instruments. Study of intermediate and advanced problems of the school string program. Analysis of methodology, materials, performance scheduling, testing, selection and care of stringed instruments. Organization and implementation of the string program. (3Su) **R. Matesky**

655. (255) Band Symposium. An intensive review of rehearsal procedures and conducting techniques. Survey of new materials. Analysis of performance. Wind and percussion clinics. Private consultation on special problems. Nationally known authorities serve with resident staff. Five hours daily first week of Summer Music Clinic. (3Su) **Staff**

680. (258) Seminar in Music Education. Musical behavior and the scientific basis for human responses to musical stimuli. (3W, Su)
Wardle

681. (259) Seminar in Music Theory. Practical aspects of musical theory as related to analysis, pedagogy and competition. (3F, Su)
Dittmer, Staff

682. (280) Seminar in Music Literature. Designed to study the development of Western music from Monody to the 20th century through analysis of its form and structure and through an investigation of all available literature. (3Sp, Su) **Dittmer, Staff**

687. (287) Individual Recital. Preparation and presentation of a graduate recital. Supervision of the major professor. Credit arranged. (F, W, Sp, Su) **Staff**

688. (367) Descriptive and Experimental Research in Music. To stimulate interest in descriptive and experimental research in Applied Music and Music Education. Emphasis upon a) structuring research designs; b) execution of an experimental project; c) preparation of the research report. (3Sp) **Wardle**

697. (285) Research and Theses. Individual work in theses writing with guidance and criticism. Credit arranged. (F, W, Sp, Su)
Staff

699. (400) Continuing Graduate Advisement.
Staff

799. (400) Continuing Graduate Advisement.
Staff

*Department of

Physics

Head: Professor W. Farrell Edwards
Office in Engineering 154

Professors Jack E. Chatelain, Wilford N. Hansen, Eastman Hatch, Lawrence R. Megill, John K. Wood

Associate Professors Jay O. Jensen, V. Gordon Lind, John J. Merrill, Akeley Miller, Vern L. Peterson

Assistant Professors Robert E. McAdams, O. Harry Otteson, William R. Pendleton

Degrees: Bachelor of Science (BS), Master of Science (MS), Doctor of Philosophy (PhD)

Major: Physics

The basic science of physics is devoted to the fundamental understanding of the phenomena of the physical universe. As the physicist views it, there are essentially three basic phenomena, namely: matter (energy), space, and time. The many interactions of matter and energy occur in space and time and are found to be the consequence of one or more of the four known fundamental forces: 1) nuclear, 2) electromagnetic, 3) nuclear particle decay, and 4) gravitational. However, it is found through the theory of relativity that space, time, and matter are further related in a very fundamental way and it may yet be learned that they are three manifestations of the same phenomena.

Current research areas in Physics today include: the quantum theory of matter and radiation; astrophysics; symmetries and conservation laws; elementary particles, nuclei, atomic and molecular structure; properties of matter in various states (liquid, gas, solid); and matter under extreme conditions (low and high temperatures, high magnetic fields, high velocities of interactions, etc.). In a more practical sense, results from these investigations are being used to harness nuclear energy, improve communication systems, construct faster, more efficient and more compact electronic computers, better biological and medical tools, to solve the problems of interspace travel and travel in general. Physicists take active parts in helping to apply fundamental knowledge to benefit mankind.

At USU the objective is to instruct the student in the known useful theories and facts about our universe, and to encourage and promote his creativity to further theorize and gain facts. For the undergraduate a basic core curriculum is provided on the subjects of mechanics, electricity, magnetism, thermodynamics, optics, astrophysics, modern physics, and relativity theory. Thus he gains knowledge. Opportunities for research presently include the areas of nuclear physics, elementary particle physics, atomic and molecular physics, X-ray physics, optics, aeronomy, surface physics, relativity, and theoretical physics. While basic research is considered

*In College of Science.

to be more a part of the graduate program, many undergraduate students have opportunities to work in the above-mentioned research laboratories. These research opportunities and those provided by special laboratory courses and projects offer the student the possibility of making a real contribution to physics and the certainty of meeting a type of challenge not usually encountered in course work.

Throughout the nation it recently appears that studies are more and more conducted in the near absence of professors. At USU, however, a close relationship exists between the Physics staff and the students. Furthermore, an attitude or philosophy exists among the staff that students can wisely use as much freedom as possible in selecting their education both in and out of their major field of Physics. This philosophy is reflected in departmental requirements, and also in a general education experiment sponsored in the department. The general education experiment offers the student the privilege of proposing his own general education requirements with serious hopes that his proposal will be accepted. The 1971-72 year will be the third year this new program will be in effect.

Undergraduate Study

The BS degree in Physics is awarded to those students who demonstrate a proficiency in understanding of the subject matter offered in the undergraduate Physics curriculum. A suggested curriculum is outlined below. (Exceptions require staff approval.)

FRESHMAN YEAR

Courses	Credits F	W	Sp
Math 105	5		
Elective	3		
Chemistry 121	5		
English 101	3		
Math 202		5	
Elective		3	
Chemistry 122		5	
English 102		3	
Math 221			5
Elective			3
Chemistry 123			5
English 103			3
Totals	16	16	16

SOPHOMORE YEAR

	F	W	Sp
Math 222	5		
Physics 221	5		
Elective	1		
Language Elective	5	5	5
Math 223		5	
Physics 222		5	
Elective		1	
Math 324			3
Physics 223			5
Computer Science			3
Totals	16	16	16

JUNIOR YEAR

	F	W	Sp
Physics 341	3		
Physics 331	2		
Physics 581	1		
Physics 451 or 411	3		
Physics 347	1		
Math 421 or 441	3		
Electives	4	4	4
Physics 342		3	
Physics 332		2	
Physics 582		1	
Physics 452 or 412		3	
Physics 367		1	
Math 422 or 442		3	
Physics 343			3
Physics 333			2
Physics 583			1
Physics 453 or 413			3
Physics 377			1
Math 423 or 443			3
Totals	16	16	16

SENIOR YEAR

Physics 471	4		
Physics 461	3		
Physics 398	2		
Physics 451 or 411	3		
Electives	5	5	5
Physics 472		4	
Physics 462		3	
Physics 382		1	
Physics 451 or 411		3	
Physics 473			4
Physics 463			3
Physics 383			1
Physics 451 or 411			3
Totals	16	16	16

Minor. A minor for a student majoring in Physics is not required. If the student wants a minor, he may select any area he wishes and complete the program as specified by University requirements for a minor. Most Physics majors accumulate enough credits in Mathematics, Chemistry or a foreign language to easily specify one of these areas if he wishes.

Teaching Major. For a teaching major in Physics, a student should complete the following programs: Physics 341, 342, 343, 347, 367, or 461, 462, 463, 347, 367 with prerequisites: Mathematics through 324. Required professional Education courses for the teaching certificates are listed in the College of Education.

An "application for admission to teacher education" should ordinarily be completed before the Junior year (see College of Education for requirements). Approval is a prerequisite to teacher certification candidacy and to enrollment in Education and Psychology courses.

Graduate Study

Master of Science Degree. A candidate for the degree of Master of Science in Physics must take an entrance examination administered by the department prior to registration. A student may be required to register for one or more undergraduate courses to correct any deficiencies which appear upon analysis of the student's work on this examination. The candidate is also required to take an examination administered by the department during the Spring Quarter of the student's first year of residence. This examination covers undergraduate and first-year graduate physics with an emphasis upon mechanics, electro-magnetic theory and quantum mechanics, especially in its coverage of first-year graduate physics. A candidate is also required to complete at least two of the first-year graduate courses in these three subjects. In addition, the student will submit either a thesis or a research paper at the discretion of the student's supervisory committee. A total of up to 15 credits may be accumulated toward the Master of Science degree credit requirements for the research work leading to the thesis or research report.

Doctor of Philosophy Degree. The Physics Department, in cooperation with related departments, offers the Doctor of Philosophy degree. A brief summary of the doctoral program in Physics includes the following: an entrance exam prior to registration; at least one year in residence at the Logan campus; a qualifying exam covering undergraduate and first-year graduate physics during Spring Quarter of the first year; a comprehensive exam with emphasis on quantum mechanics, electricity and magnetism and classical mechanics usually at the completion of the second year; an examination conducted by the Language Department in German, French, or Russian; a thesis and a thesis defense, credit requirements are 135 credits and may include (in addition to recommended courses) up to 45 credits for the thesis, transfer credit (determined on an individual basis), and credit for preliminary thesis research.

Physics Courses

Undergraduate

100. (9) The Solar System. The interrelation of members of the solar system and their consistency as explained by the laws of physics, a study of the planets, the asteroids, meteors, comets, satellites of planets and artificial satellites and space probes. Kepler's laws of motion, planetary composition and

structure, atmospheric phenomena of magnetic fields, aurora, red sunsets, and refraction. (3W) **Staff**

108. (10) Stars and Galaxies. Modern theories and ideas concerning the sun, stars and galaxies treated as to their physical properties, structure and evolution and how the astronomer obtains such information. Recent discoveries in astronomy such as pulsars, quasars and gravitational waves. (3F, Sp) **Staff**

110. (3) Introductory Physics. A descriptive course for students not majoring in Science or Engineering. Fundamental physical principles with a minimum of algebra. (5F, W, Sp, Su) **Staff**

120. (6) General Physics. A survey course in physics, with a laboratory. Covers fundamental physical principles with emphasis on how a problem is approached and solved in physics. (5F, W, Sp) **Staff**

200. (60) Astronomy. An introduction to astronomy and astrophysics for the student with some science and math background. The solar system; the creation, evolution and death of stars; galaxies and cosmology. Prerequisites: Math 106, Physics 120. (3Sp) **Staff**

111, 112, 113. (17, 18, 19) General Physics. Mechanics, electricity, magnetism, heat, light, sound, atomic and nuclear physics, for non-science majors. Prerequisite: Math 105 or 106. Recommended: Math 220. Should be taken in sequence except with permission of instructor. Two lectures, three recitations and one lab per week. (5F, W, Sp) **Staff**

221, 222, 223. (20, 21, 22) General Physics-Science. Mechanics, electricity, magnetism, heat, light, sound, atomic and nuclear physics for science majors and engineers. Prerequisite: Math 220. Recommended: Concurrent registration in Math 221. To be taken in sequence except with permission of instructor. Two lectures, three recitations and one lab per week. (5Sp, W) **Staff**

317. (184) Optics Laboratory. Advanced experimental work in optics such as refraction in inhomogeneous media, diffraction, polarization, photometry, spectra, information retrieval. Prerequisite: Concurrent or previous registration in Physics 411. (1) **Staff**

331, 332, 333. (156, 157, 158) Introduction to the Theory of Relativity. Foundation, formulation and predictions of the theory of relativity and applications to modern and classical physics. Advanced courses in mechanics and electricity and magnetism are considered helpful but not necessary. (2F, W, Sp) **Staff**

341, 342, 343. (153, 154, 155) Analytical Mechanics. Classical mechanics in its role as the base on which the whole pyramid of modern physics has been erected. In addition to the mechanics of particles and rigid bodies, the course emphasizes the crucial role of the conservation laws. The powerful methods of Lagrange are introduced and developed. Prerequisite: Differential Equations. (3F, W, Sp) **Staff**

347. (181) Mechanics Laboratory. Experiments on linear and non-linear oscillatory motion with and without coupling and experiments on elastic behavior of bodies. Makes use of calculus and some differential equations. Prerequisite: Concurrent or previous registration in Physics 341. (1) **Staff**

351. (140) Biophysics I. Foundations of physical measurements in biology with emphasis on optical methods: microscopy including phase and interference, spectroscopy, X-ray techniques, crystal analysis. Prerequisite: Physics 113 or 321. (3) **Staff**

352. (141) Biophysics II. Introduction to quantitative biology. Underlying physical principles involved in biophysical phenomena. Prerequisite: Physics 173 or 223. (3) **Staff**

367. (182) Electricity and Magnetism Laboratory. Experiments with direct and alternating current bridges, experiments to examine the mechanical and electrical details of galvanometer and other meter behavior, and experiments concerning feedback and filter and other transfer properties. Makes use of calculus and some differential equations. Prerequisite: Concurrent or previous registration in Physics 461. (1) **Staff**

370. (122) Survey of Modern Physics I. For engineering, science, and teaching majors. (3W) **Jensen**

377. (183) Atomic Physics Laboratory. Experiments in atomic physics such as the measurements of electronic charge by the Millikan oil drop experiment and the Franck and Hertz experiment. Makes use of calculus and some differential equations. Prerequisite: Concurrent or prevous registration in Physics 333. (1) **Staff**

381, 382, 383. (193, 194, 195) Seminar in Physics. A weekly meeting of staff and Physics majors consisting of reports on recent developments in physics. Students receive credit for course by making reports. (1F, W, Sp) **Staff**

391, 392, 393. (196, 197, 198) Selected Readings in Physics. (1F, W, Sp) **Staff**

398. (188) Special Problems in Physics. A laboratory course to give the advanced student experience with precision instruments and their use in physics. (1-3F, W, Sp) **Staff**

401, 402, 403. (110, 111, 112) Astrophysics. An introduction to the physics of planetary

and stellar systems. A study of celestial mechanics as applied to these systems will constitute about one-third of the course. The remaining time will be used in studying stellar atmospheres and interiors for various types of stars in various stages of evolution. (3F, W, Sp) **Peterson**

411, 412, 413. (166, 167, 168) Wave Theory and Optics. Three-quarter sequence covering optics and related topics. Emphasis on wave motion and diffraction phenomena; also geometrical optics, aberrations, interference, polarization, X-ray optics, and atomic spectra. (3F, W, Sp) **Staff**

420. (130) Nuclear Physics. A survey of methods and results of recent investigations of nuclear processes. To follow Physics 370. (3Sp) **Staff**

427. (131) Nuclear Detection Methods. Designed to familiarize the student with instruments, techniques of measurement, and elements of health safeguards used in nuclear physics. (2F, W, Sp) **Staff**

450. (143) Radiobiology. Designed to acquaint students in Medical Technology, Botany, Zoology, pre-Medicine, pre-Veterinary, and Agriculture with a foundation of techniques in health physics, radiation monitoring and measuring and isotope handling. Prerequisite: One quarter of General Physics (PS 110). **Jensen**

451, 452, 453. (160, 161, 162) Thermal Physics. A study of theoretical models devised to correspond with the observed behavior of matter in bulk in terms of heat and energy. (3F, 3W, 3Sp) **Staff**

461, 462, 463. (175, 176, 177) Electricity and Magnetism. Electromagnetic phenomena as it applies to statistics, dynamics and circuits. Use of vectors, calculus and differential equations. (3F, 3W, 3Sp) **Staff**

471, 472, 473. (125, 126, 127) Modern Physics. Application of special relativity and quantum mechanics of atomic structure, molecular physics, solid state physics, X-rays and nuclear physics. Prerequisite: Physics 343 or 463. Three lectures, one recitation. (4F, 4W, 4Sp) **Staff**

500. Introduction to Aeronomy. A survey of the properties and processes in the upper atmosphere. Topics included are atmospheric structure, magnetospheric phenomena, the ionosphere, solar terrestrial relationships, aurora and airglow, and atmospheric reactions. (3Sp) **Baker**

570. (207) Quantum Mechanics for Electrical Engineers. Wave packets, uncertainty principle, Schroedinger equation, operators and eigen values and other principles of quantum mechanics. Application to problems of interest to Electrical Engineers. (4) **Staff**

581, 582, 583. (204, 205, 206) Physics Colloquium. A series of invited lectures on specialized topics in Physics and related subjects. (1F, 1W, 1Sp) **Staff**

Graduate

611, 612, 613. (210 211, 212) X-Ray Diffraction, Crystallography, Scattering and Spectra. To acquaint students with the physics of X-rays. Prerequisites: Physics 471, 472, and 473, or the equivalent. (3F, 3W, 3Sp) **Staff**

614, 615, 616. (220, 221, 222) Atomic Spectra, Molecular Spectra, Spectrographic Measurements. Electromagnetic radiation arising from atomic and molecular sources treated in terms of quantum mechanical models. Laboratory and field techniques for detection and analysis of radiation from such sources. (3F, 3W, 3Sp) **Staff**

631, 632, 633. Space Science and Engineering. First-year graduate level study of the engineering aspects of space exploration. Study topics include a survey of the cosmos and the solar system, the nature of the space environment and upper atmosphere, physical measurement techniques and instruments, space vehicles, celestial mechanics, spacecraft mechanics, spacecraft guidance, navigation, attitude sensing and control, space communication, telemetry systems, areospace equipment design, cryogenics, and aerospace electronics. (3F, 3W, 3Sp) **Wyatt**

641, 642, 643. (290, 291, 292) Theoretical Mechanics. Conservation principles, Lagrange equations, orbit theory, rigid body motion, canonical formulation, action principle, Hamilton's equations and other well-known techniques in classical mechanics with applications to various types of problems. Provides theoretical background for quantum mechanics. (3F, 3W, 3Sp) **Staff**

661, 662, 663. (296, 297, 298) Theoretical Electricity and Magnetism. Fundamental laws of electrostatics, magnetostatics, time varying fields and electromagnetic waves. Extensive use is made of vector calculus. Relativisitic electricity and magnetism is treated and applications are made to problems such as charged particle collisions, radiation by moving charges, Bremsstrahlung, and multiple fields. (3F, 3W, 3Sp) **Staff**

664, 665, 666. (200, 201, 202) Solid State Physics. Elastic, thermal, electric, and magnetic properties. Considerable time is devoted to the study of conductors and semiconductors (especially germanium and silicon). Prerequisites: Physics 473, 463, and 453 or instructor's consent. Concureent registration in Physics 751 is recommended. (3F, 3W, 3Sp) (Offered alternate years.) **McAdams**

671, 672, 673. (285, 286, 287) Introductory Quantum Mechanics. Theoretical framework

of the more elementary phases of quantum mechanics with applications. Wave packets, uncertainty principle, Schroedinger equation, Pauli principle, matrix mechanics, Hilbert spaces, observables as operators and eigen values. (3F, 3W, 3Sp) **Staff**

674. (288) Introductory Quantum Mechanics. Continuation of 673 with an introduction to relativisitic quantum mechanics. (3F) **Staff**

697. (250) Thesis Research. Advanced research under guidance of one or more faculty members. Credit arranged. **Staff**

698. (400) Research Consultation. MS.

699. (400) Continuing Registration. MS. **Staff**

701, 702, 203. Aeronomy. To introduce the first-year graduate student to the physical processes operating in the Earth's high atmosphere. Topics to be covered will include composition and temperature of the atmosphere, energy balance, atomic and molecular processes and dynamic. Emphasis will be based on the application of knowledge which the student has already acquired to solution of real physical problems. Prerequisite: Solid foundation in the physical sciences. (3F, 3W, 3Sp) **Megill**

704. Ionospheric Physics. A discussion of the observational and theoretical aspects of ionospheric physics. Topics to be covered include production and loss mechanisms for the ionozation, transport processes, and effects of ionospheric storms. The emphasis will be on the ionosphere above 100 km. (3F) **Peterson**

705. Atmospheric Chemistry and Photochemistry. (See Chemistry 705.)

706. Circulation of the High Atmosphere. Dynamics of the stratospheric and mesospheric circulation systems in cartesian and wavenumber space; gravity wave mechanisms above the jet stream level; large-scale circulation patterns of the stratosphere and mesosphere; sudden stratospheric warming; stratospheric transport and hemispheric mass exchange; vertical motions and energy transformations in the stratosphere; ozone anomalies and radiation warming. (3Sp) **Wooldridge**

721, 722, 723. (230, 231, 232) Nuclear Physics. Nuclear size and shape, low-energy neutron-proton scattering, the deutron, semi-empirical mass formulas, nuclear fission, nuclear reactions, the nuclear shell and unified models, electromagnetic interactions with nuclei and beta decay. Prerequisites: Physics 673 or instructor's consent. (3F, 3W, 3Sp) **McAdams**

724. (235) Elementary Particle Physics. Particle interactions and decays, symmetry principles and conservation laws. (3) **Staff**

731, 732, 733 (275, 276, 277) Relativity and Cosmology. Einstein's special and general theory of relative motion. The principle of equivalence, Mark's principle, the Reimann-Christoffel curvature tensor, possible solutions of the field equations, and applications to modern physics to astronomical bodies, and to the universe. (3F, 3W, 3Sp) **Staff**

751, 752, 753. (260, 261, 262) Thermodynamics, Kinetic Theory, Statistical Thermodynamics. Statistical behavior of bulk matter according to classical and quantum mechanical models. (3F, 3W, 3Sp) **Staff**

771, 772, 773. (270, 271, 272) Quantum Field Theory. Presents fields (Bose and Fermi), their quantization and interaction. (3F, 3W), 3Sp) **Staff**

781, 782, 783. (293, 294, 295) Graduate Seminar in Physics. Credit arranged. (F, W Sp, Su) **Staff**

797. (250) Dissertation Research. PnD. Credit arranged. **Staff**

798. (400) Research Consultation. PhD. Credit arranged. **Staff**

799. (400) Continuing Registration. PhD. Credit arranged. **Staff**

*Department of

Plant Science

Head: Professor David R. Walker

Office in Agricultural Science 322

Professors Rulon S. Albrechtsen, Keith R. Allred, J. Clark Ballard, Douglas R. Dewey (USDA-ARS), Wade G. Dewey, Alvin R. Hamson, K. W. Hill, Wesley Keller (USDA-ARS), DeVere R. McAllister, Marion W. Pedersen (USDA-ARS), Leonard H. Pollard, Frank B. Salisbury, J. Clair Theurer (USDA-ARS)

Professors Emeritus William H. Bennett, D. C. Tingey

Associate Professors A. Fullmer Allred, J. LaMar Anderson, Glenn T. Baird, Joel Barlow, Melvin Burningham, William F. Campbell, Louis A. Jensen, Golden L. Stoker, Gordon A. Van Epps

Assistant Professors John O. Evans, James H. Thomas[1]

Associate Professor Emeritus Anson B. Call, Jr.

Lecturer David D. Gibby

Research Associates Alice Denney, Rulon P. Draper, Robert K. Gerber, Roland G. Murdock, Manfred Weidner

Collaborators DeVon L. Doney, George K. Ryser

Degrees: Bachelor of Science (BS), Master of Science (MS), Doctor of Philosophy (PhD)

Majors: Agronomy, Crop Management, Crop Physiology, Horticulture, Plant Breeding, Plant Nutrition, Plant Science, Weed Science.

Study and research in Plant Science investigate not only basic aspects of plant function, but a constant goal is to apply this knowledge to the problem of crop production, especially in arid regions. Course offerings include studies of the interrelationships of plants grown under a variety of conditions with particular emphasis on factors contributing to production of maximum quality and yield. Opportunity is provided for basic studies of these complex relationships in addition to application of new knowledge to modern agriculture.

Bachelor of Science degrees are offered under a science curriculum, a general curriculum, and a business curriculum (see adviser).

Please note that the introductory course, Plant Science 100, is a prerequisite to all other undergraduate Plant Science courses for all Plant Science majors. Nonmajors may avoid this prerequisite by obtaining permission from the instructor of a given course.

Facilities. The Plant Science Department operates several classrooms, laboratories, and greenhouses on campus. These include equipment for control of environment and for modern biochemical research. In addition, the department is responsible for two experimental farms in the state of Utah. These are located at Farmington, North Ogden, Snow College, and Nephi.

*In College of Science.

[1]On Leave.

Undergraduate Study

Science Curriculum. This curriculum offers the following options: Crop Nutrition and Physiology, Plant Breeding, and Weed Science. It is designed for students who are capable and have the desire to continue their education beyond the bachelor's degree. It provides an excellent background in science supplemented with selected courses in production and management. By choosing one of the options, students may take courses during their Senior year that will better prepare them for graduate work in their field of specialization. In addition, students graduating in the science curriculum are qualified for positions in industry, education, or with federal or local governmental organizations.

General Curriculum. Students interested in this curriculum will follow the plan of courses outlined below. With some modification in the plan they can qualify in either Agronomy or Horticulture.

Special training can be taken in the areas of field crop production and management, weed control, turf management, fruit crops, vegetable crops, and ornamental plants.

This curriculum prepares a student for positions in farming, in industry (fieldman), in the agricultural extension service, in federal, state, or local government organizations. This curriculum also prepares a student for graduate school, but not as well as does the science curriculum.

Graduate Study

Master of Science Degree. The department, in cooperation with related departments, offers Master of Science programs in Plant Breeding, Crop Physiology, Crop Production and Management, Weeds and Weed Control, and Plant Nutrition.

Doctor of Philosophy Degree. The department, in cooperation with related departments, offers the degree of Doctor of Philosophy in Plant Nutrition, Crop Management, Plant Breeding, and Crop Physiology.

Plant Science Courses

Undergraduate

100. (2) Introduction to Agricultural Plant Science. A survey course designed as an introduction for majors in the field and as a fairly complete summary for non-majors. Includes discussions of world crops, soil and crop management, and topics relating to modern developments, such as plant breeding and propogation, use of agricultural chemicals, turf, and controlled environments (greenhouses and phytotrons). Three lectures and one special events period. (4W) **Staff**

200. (11) Garden Flowers. Identification, culture and landscape use of bulbs, annuals and perennials. (3Sp) **Gibby**

300. (17) Indoor Plants and Flowers. Culture and management of bedding plants, cut flowers, pot plants, and foliage plants. (3W) **Staff**

301. (118) Flower Arranging for the Home. Principles of design, care and use of floral materials in arrangements and corsages. House plant care. Lab fee required. (3F) **Gibby**

330. (107) Grain Crops. Classification, history, and cultural methods involved in the production of grain crops. Two lectures, one lab. Prerequisite for majors: Plant Sci 100. (3W) **Albrechtsen, Dewey**

331. (108) Root and Miscellaneous Crops. Cultural methods, market grades, and commercial possibilities of sugarbeets, potatoes, tobacco and other crops. Prerequisite for majors: Plant Sci 100. (3F) **Allred**

350. (100) Propagation, Pruning, and Grafting. A practical course for all students in the University, dealing with the science and art of pruning and grafting of horticultural plants. Methods of asexual propagation. Special emphasis on fruit trees, but small fruit and ornamental trees and shrubs also included. (3W) **Walker**

400. (111) Ornamental Horticulture. Aesthetic use of plants, including foliage plants and

cut flowers for indoor use and landscape materials for enhancing the home and community. Topics are organized around the controlled-environment culture of florist crops (greenhouse management) and the propagation and nursery practices required to produce landscape materials (shrubs, trees, evergreens, and bedding plants). (3Sp) **Gibby**

420. (105) Turf Management. Kinds of turf grasses, their fertility and management, for home lawns, golf courses, and athletic fields. (2Sp) **Allred**

432. (103) Forage Crops. Alfalfa, clovers, grasses, and other farm forages, classification and methods of production, harvesting and storage, meadow and pasture management. The place of forage crops in rotations and soil conservation. Three lectures, one lab. Prerequisites: Botany 110, Plant Sci 100 (majors). (4Sp) **Allred**

***433. (115) Arid Land Culture.** Principles of dry farming from practical and scientific standpoints, a survey of agricultural work in the Great Plains and the mountain regions, an analysis of the possibilities in typical climatic areas and on important soil types. Prerequisites: Plant Sci 100 (majors), 330. (2W) **McAllister**

440. (104) Vegetable Production. Principles and practices underlying production of vegetable crops, including varieties, fertilizers, pest control, harvesting, storage, and processing. Emphasis will be placed upon culture of the major vegetable crops. Three lectures. (3W) **Staff**

450. (117) Fruit Production. Varieties, soils, sites, fertilizers, culture, pest control, harvesting, storage propagation, and stocks. Prerequisite for majors: Plant Sci 100. (3F) **Anderson**

460. (120) Seed Production. Methods, problems and commercial production of field, vegetable, and flower seeds in the Intermountain West. Prerequisite: Plant Sci 100, Botany 110 or instructor's consent. (4F) **Staff**

489. (199) Seminar. Review and discussion of current agronomic problems, practices, and available employment. Required of all Seniors in the department. One lecture. (1F, W, Sp) **Staff**

490. (197) Special Problems. Conferences or laboratory investigations. Subject and credit arranged. **Staff**

555. (119) Weed Science. Identification of weeds, weed problems in agriculture, and methods of control. Three lectures, one lab. Prerequisite for majors: Plant Sci 100. (4F) **Anderson**

565. (131) Agricultural Sprays and Dusts. Preparation, properties, and uses of agricultural chemicals used in disease, insect, and weed control: application of fruit thinning, growth regulator, and nutritional sprays. Design, operation, and care of the application equipment. Jointly administered by the departments of Botany, Plant Science, and Zoology. Prerequisites: Botany 550, Entomology 539 or special permission. Three lectures, two labs. (5Sp) **Anderson, Cannon, Davis**

570. (109) Plant Breeding. Principles, techniques, and practices in breeding improved varieties of crop plants. Prerequisite for majors: Biology 512, Plant Sci 100. (5W) **Albrechtsen, Dewey**

Graduate

****631. (208) Field Crops.** Recent advances in the improvement and production of cereal, potato, and sugar beet crops. Prerequisites: Plant Sci 330, 331. (3W) **McAllister**

****632. (201) Forages. Prerequisite:** Plant Sci 432 or quivalent. (3Sp) **Allred**

***640. (204) Vegetable Production.** Fundamental principles relating to technical horticultural practices in vegetable crop production, seed storage, growth and development nutrition, water relations, temperature, light, photoperiod, weed control and growth regulators. Prerequisite: Plant Sci 440. (4W) **Hamson**

***650. (217) Fruit Production.** Growth, development, nutrition, water relations, fruit setting, dormancy, and use of growth regulators in fruit production. Prerequisites: Botany 440 (or take concurrently), Organic Chemistry, Plant Sci 450. Three lectures, one lab. (4Sp) **Walker**

***655. (219) Biochemical Basis of Herbicidal Action.** Entrance, movement and metabolism of chemicals of herbicidal importance in plants. A critical study of the physiological processes which appear to be affected by the several classes of compounds used as herbicides. Prerequisites: Botany 440, Chemistry 670. (3W) **Evans**

***655. (219) Biochemical Basis of Herbicidal Action.** Entrance, movement and metabolism of chemicals of herbicidal importance in plants. A critical study of the physiological processes which appear to be affected by the several classes of compounds used as herbicides. Prerequisites: Botany 440, Chemistry 670. (3W) **Evans**

****670. (209) Plant Breeding.** Principls and theory underlying plant breeding. Includes discusion of quantitative inheritance, herita-

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**Taught 1972-73.

bility, heterosis, interspecific crossing, mutation breeding, and others. (3W)
Albrechtsen, Dewey

675. (222) Control of Reproduction in Plants. Ways in which flower, fruit, and seed production can be controlled in horticultural and agronomic crops, including the topics of vegetative propagation, vernalization, and photo-periodism. Prerequisite: Botany 440. (3Sp) **Salisbury**

*676. (223) Crop Ecology. Physiological basis of interaction between crop plants and environment (plant adaptation to environment), based upon consideration of specific crop plants (species, varieties, individuals) of the world as they respond to specific factors of the environment such as light, temperature, and moisture, integrating concepts of plant physiology, genetics, climatology, geology, and soil science. Prerequisites: Botany 440, Plant Sci 100, or instructor's consent. Three lectures. (3Sp) **Salisbury**

680. (260) Methods in Plant Science Research. Research methods using chromatography, radioisotopes, experimental plot design, and instrumental analysis. Prerequisites: Chemistry 332, Botany 440, Applied Statistics 432. One lecture, one lab. (2W) **Staff

689. (299) Seminar. Oral and written reports by graduate students. (1F, W, Sp) **Staff**

690. (297) Special Problems. Credit arranged. Registration by permission only. **Staff**

697. (298) Research and Thesis. Credit arranged. **Staff**

699. (400) Continuing Graduate Advisement. **Staff**

797. (298) Research and Thesis. **Staff**

799. (400) Continuing Graduate Advisement. **Staff**

*Taught 1971-72.
**Taught 1972-73.

**Department of*

Political Science

Head: Professor JeDon A. Emenhiser
Office in Main 248

Professors Milton C. Abrams, Wendell B. Anderson, Claude J. Burtenshaw, M. Judd Harmon

Professor Emeritus M. R. Merrill

Associate Professors Robert W. Mollan, Phillip S. Spoerry, H. Preston Thomas

Assistant Professors William L. Furlong, Calvin W. Hiibner, Dan E. Jones

Instructor Richard C. Haycock

Degrees: Bachelor of Science (BS), Bachelor of Arts (BA), Master of Science (MS), Master of Arts (MA)

Majors: Political Science, Pre-Law

Political scientists study those human activities involving attempts to secure favorable decisions through the exercise of influence. Most political scientists concentrate their attention on decisions that affect the public and on influence that is brought to bear upon government.

The political scientists engages often in interesting and exciting subject matter; disciplines him-

*In College of Humanities, Arts and Social Sciences.

self to read analytically, to write clearly, and to express himself orally; and deals with abstract ideas. He also learns that most human social behavior is predicated upon values and that there is a constant competition between and among values in society. He tests his own values with evidence rather than mere rhetoric and comes to realize that "clever maxims and moralistic resolutions" seldom serve to analyze, let alone solve complex social problems. Today there is a large demand for persons who are trained in the study of politics for careers in government, business, and teaching.

Undergraduate Study

Students who major in Political Science or Pre-Law should have at least 35 credits in the field. All major students should complete successfully Political Science 110, American National Government. Students must have grades of "C" or above in all courses counted toward the major. A 2.5 grade average in the major field is required for graduation. Before being certified for graduation by the department, the student must pass a comprehensive examination consisting of four 30-minute essays — one on American politics and a choice of three from comparative politics, international relations, political theory, public law, and public administration. Seniors should take the exam Fall Quarter. Seniors are encouraged to take the national Graduate Record Examination in the Fall Quarter of their Senior year.

All students who wish to graduate in Political Science or Pre-Law should have a member of the department as an adviser.

Pre-Law Major. USU has been very successful in preparing students to enter professional law schools. The success of these students both in the professional training period, and thereafter, indicates the high quality of the preparation.

Most law schools admit only college graduates. Only a few admit students with less training. College graduation is strongly recommended even though it may not be required for admission.

Those who plan to enter law school should take the Law School Admission Test several months prior to the desired entrance time. Most law schools now require that test scores be included in the applications. Applications for the test should be made to Testing Services, Main 2, or to the Political Science Department, Main 248.

Following is a recommended curriculum for Pre-Law students. This has been carefully prepared to conform to the recommendations of the law schools themselves. Some modification is possible.

Recommendations

American Politics: Poli Sci 110 is required. Optional selections from the following: Poli Sci 105, 111, 510, 512, 514, 561, 681. Total minimum credits — 12.

Comparative Politics: Optional selections from the following: Poli Sci 220, 521, 522, 523, 525, 526, 527, 681. Total minimum credits — 3.

International Relations: Optional selections from the following: Poli Sci 210, 440, 542, 681. Total minimum credits — 3.

Political Theory: Optional selections from the following: Poli Sci 531, 532, 533, 534, 535, 536, 681. Total minimum credits — 7.

Public Law: Optional selections from the following: Poli Sci 518, 564, 571, 572, 573, 681. Total minimum credits — 6. Additional courses to total at least 35 credits.

Minor. The lawyer must be familiar with as many areas of human endeavor as possible. It is

recommended that the Pre-Law student emphasize the following areas: English, American and European History, Literature, Psychology, Sociology, and Economics. Prospective lawyers should be reasonably skilled in typing and familiar with accounting procedures.

Careers

International Relations. Unusual career opportunities are available for those possessing the requisite aptitudes and training. The U.S. Department of State, its Foreign Service, and many other governmental agencies offer a wide range of opportunities. Private American businesses are expanding foreign operations and international trade. These companies constantly seek qualified personnel. It is recommended that students contemplating an International Relations speciality become proficient in at least one foreign language. Students having a special interest in this area are invited to join the International Relations Club.

Public Administration. The career opportunities for persons trained in Public Administration include management positions in city, county, state, national, and international agencies. Administrative positions in finance and personnel are both rewarding and challenging.

Activities

Pi Sigma Alpha, the national political science honor society, encourages all majors to attend its programs and invites those who meet its high standards to apply for membership.

Graduate Study

Master of Science and Master of Arts in Political Science. The program of study for the Master of Science and Master of Arts degrees in Political Science is described in the Graduate School Catalog. Students interested in the programs should obtain a copy of the Graduate Catalog and must also consult with a member of the Political Science faculty.

Political Science Courses

Undergraduate

105. (182) Current Political Problems. Background and analysis of current political events. (2F, W, Sp) **Haycock**

110. (10) American National Government and Politics. U.S. constitution, political parties and elections, pressure groups, congress, president and bureaucracy, courts, civil rights and liberties, and foreign affairs. (5F, W, Sp) **Haycock, Jones, Mollan, Thomas**

110-H. (10-H) American National Government and Politics for Honors Students. (5F) **Thomas**

111. (15) American State and Local Government and Politics. State constitutions, legislatures, governors, courts, counties, municipalities, special districts, and intergovernmental relations. (3F, Sp) **Jones, Thomas**

210. (102) Introduction to International Politics. Relations between and among nation-states. (3W) **Anderson, Furlong**

220. (70) Introduction to Comparative Politics. Structures, functions, processes, and roles in various political systems. (4F, Sp) **Furlong, Spoerry**

230. (new) Introduction to Political Theory. Political values and scientific explanations of political events. (3W) **Spoerry**

250. (50) Introduction to Political Analysis. Political data and analytical techniques. (3W) **Emenhiser**

440. (101) American Foreign Policy. Formulation, execution, and impact. (3F) **Anderson, Furlong**

441. (103) Causes of War and Conditions for Peace. Psychological, economic, geographic, and sociological bases of international tension: evaluation of proposals for managing conflict. (3W) **Anderson**

490. (190) Senior Seminar. Comprehensive perspective of political science as a discipline. (3F) **Emenhiser**

510. (125) American Electoral Politics. Political parties, campaigns, and elections. Prerequisite: Poli Sci 110.[1] (3F) **Jones**

511. (124) American Political Opinion. Public opinion and pressure groups. Prerequisite: Poli Sci 110.[1] (3W) **Jones**

512. (140) American Legislative Politics. Congress and state legislatures. Prerequisite: Poli Sci 110.[1] (3W) **Thomas**

514. (167) American Judicial System. Courts in both their legal and political roles. Prerequisite: Poli Sci 110.[1] (5Sp) **Thomas**

***515. (115) American State Government and Politics.** Emphasizes problems of Utah government. Prerequisite: Poli Sci 111.[1] (3Sp) **Anderson**

****516. (114) American Federalism.** National-state and state-state legal and political relation. Prerequisite. Poli Sci 111.[1] (3Sp) **Anderson**

517. (new) Metro-Urban Politics. Prerequisite: Poli Sci 111.[1] (3W) **Hiibner**

****518. (139) American Criminal Justice.** Constitutional protections and legal procedure. Prerequisite: Poli Sci 110 or 111.[1] (3F) **Thomas**

521. (170) Western European Government and Politics. Britain, France, and Germany, plus Italy and Scandanavia. (3F) **Anderson**

***522. (173) Soviet and Eastern European Government Politics.** Prerequisite: Poli Sci 220.[1] (4Sp) **Spoerry**

***523. (176) Middle Eastern Government and Politics.** Includes North Africa. Prerequisite: Poli Sci 220.[1] (3W) **Furlong**

****524. (176) African Government and Politics.** Sub-Sahara Africa. Prerequisite: Poli Sci 220.[1] (3Sp) **Spoerry**

***525. (171) East Asian Government and Politics.** Prerequisite: Poli Sci 220.[1] (5W) **Spoerry**

526. (175) South and Southeast Asian Government and Politics. Prerequisite: Poli Sci 220.[1] (3Sp) **Spoerry**

527. (177) Latin American Government and Politics I. Colombia, Venezuela, Ecuador, Peru, Bolivia, Brazil, Chile, Paraguay, Argentina, and Uruguay. Prerequisite: Poli Sci 220.[1] (3F) **Furlong**

528. (178) Latin American Government and Politics II. Mexico, Cuba, Haiti, Dominican Republic, Guatemala, El Salvador, Honduras, Nicaraugua, Costa Rica, and Panama. Prerequisite: Poli Sci 220.[1] (3W) **Furlong**

530. (new) Advanced Political Theory. Normative and systematic theory. Prerequisite: Poli Sci 230. (3W) **Spoerry**

531. (117) American Political Thought I. From colonization to the Jeffersonians. Prerequisite: Poli Sci 230.[1] (2W) **Mollan**

532. (118) American Political Thought II. From the Jacksonians to the 1920's. Prerequisite: Poli Sci 230. (2W)[1] **Mollan**

533. (119) American Political Thought III. From the New Deal to the present. Prerequisite: Poli Sci 230.[1] (2Sp) **Mollan**

534. (145) History of Political Thought I. Plato, Aristotle, the Stoics, Augustine, Aquinas, Marsilio and William, Machiavelli, Luther, and Calvin. Prerequisite: Poli Sci 230.[1] (3F) **Harmon**

535. (146) History of Political Thought II. Hobbes, Locke, Montesquieu, Rosseau, Hume, Burke, Bentham, and Hagel. Prerequisite: Poli Sci 230.[1] (3W) **Harmon**

536. (147) History of Political Thought III. Socialism, communism, fascism, nazism, democracy. Prerequisite: Poli Sci 230.[1] (3Sp) **Harmon**

540. (new) Advanced International Politics. Empirical theories and analysis of the nation-state system. Prerequisite: Poli Sci 210.[1] (3Sp) **Anderson, Furlong**

541. (128) International Law. Basic principles through case method. Prerequisite: Poli Sci. 210.[1] (5W) **Anderson**

542. (new) International Political Organizations. United Nations and Atlantic community. Prerequisite: Poli Sci 210.[1] (3Sp) **Anderson**

550. (126) Advanced Political Analysis. Sociometry, semantic differential, Q sort, scale analysis, indexes, cluster-bloc analysis, game theory, and simulation. Prerequisite: Poli Sci 250.[1] (3Sp) **Emenhiser**

551. (123) Survey Research. Constructing questionnaires, sampling, interviewing, analysis. Prerequisite: Permission of the instructors. (4F) **Bylund and Jones**

552. (new) Social Statistics. See Sociology 552. Prerequisite: Mathematics 105.

561. (151) Organization and Management of Public Administrative Agencies. Basic models, decision making, communication, and public accountability. Prerequisite: Poli Sci 110.[1] (3F) **Hiibner**

562. (152) Public Personnel Administration. Recruitment, training, and evaluation. Prerequisite: Poli Sci 110.[1] (3W) **Hiibner**

563. (153) Public Finance Administration. Budgetary processes and policies. Prerequisite: Poli Sci 110.[1] (3Sp) **Hiibner**

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[1]Or instructor's consent.
*Taught 1971-72.
**Taught 1972-73.

564. (131) Administrative Law. Legal control of administrative agencies. Prerequisite: Poli Sci 110.[1] (3Sp) **Thomas**

565. (new) Administration in Developing Areas. Role of public administration in developing societies. Prerequisite: Poli Sci 220.[1] (3F) **Furlong, Spoerry**

571. (136) American Constitutional Law I. Governmental powers, separation of powers, checks and balances, and federalism through U.S. Supreme Court cases. Prerequisite: Poli Sci 110.[1] (3F) **Mollan**

572. (137) American Constitutional Law II. Racial equality and voting rights. Prerequisite: Poli Sci 110.[1] (3W) **Mollan**

573. (138) American Constitutional Law III. Freedom of religion and expression. Prerequisite: Poli Sci 110.[1] (3Sp) **Mollan**

581. (104) National Security Policy. Decision making options in U.S. defense programs. Prerequisite: Poli Sci 110.[1] (3W) **Mollan**

583. (new) Business and Government. See Economics 530.

591. (154) Internship. Electoral — experience in a campaign for election to public office. Prerequisite: Poli Sci 510.[1] **Legislative**—experience in Congress or state legislature as staff aide. Prerequisite: Poli Sci 512.[1] **Administrative**—experience in a public executive agency. Prerequisite: Poli Sci 561.[1] (2F, W, Sp) **Staff**

609. (205) Philosophy of the Social Sciences. See Philosophy 609. (3F) **Crawford, Robson**

681. (220) Seminar. American Politics. Prerequisites: Poli Sci 110 and at least one of the following: 510, 511, 512, 513, 515, 516, 517, or 518.[1] **Comparative Politics.** Prerequisites: Poli Sci 220 and at least one of the following: 521, 522, 523, 524, 525, 526, or 528.[1] **Political Theory.** Prerequisites: Poli Sci 230 and at least one of the following: 530, 531, 532, 533, 534, 535, or 536.* **International Politics.** Prerequisites: Poli Sci 240 and at least one of the following: 440, 441, 540, 541, or 542.[1] **Public Law.** Concentration on literature of the sub-field and exploration of an individually selected topic. Prerequisites: 110, 571. (3F, W, Sp) **Staff**

691. (202) Tutorial. Credit arranged. Prerequisite: Instructor's consent. (F, W, Sp) **Staff**

697. (211) Master's Thesis Research. Credit arranged. Prerequisite: Admission to candidacy. (F, W, Sp) **Staff**

699. (400) Master's Continuing Registration. Prerequisite: Admission to candidacy. (3F, W, Sp) **Staff**

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[1]Or instructor's consent.

*Taught 1971-72.

**Taught 1972-73.

*Department of

Psychology

Head: Professor Heber C. Sharp

Office in Education 309

Professors David R. Stone, E. Wayne Wright

Professor Emeritus Arden Frandsen

Associate Professors Michael Bertoch, Glendon Casto, Keith Checketts, Carl D. Cheney, John Cragun, Ronald Peterson

Assistant Professors J. Whorten Allen, Roland Bergeson, Paul Cook, Edward Crossman, Elwin Nielsen, J. Grayson Osborne, John Priollaud, Richard Powers

Guest Lecturer Reed Morrill

Degrees: Bachelor of Arts (BA), Bachelor of Science (BS), Master of Arts (MA), Master of Science (MS), Master of Education (MEd), Doctor of Education (EdD), and Doctor of Philosophy (PhD)

Major: Psychology (A broad range of emphasis is available at the undergraduate level.)

Psychology is the important science concerned with the study of behavior. Psychologists use precise methods and techniques in the study of both humans and lower animals in order to make more accurate statements concerning the behavior of man. Humans are studied and worked with both in the laboratory and in real life situations. Psychologists are concerned with the modification and prediction of behavior. Other animals are also studied in laboratory and field conditions in attempts to isolate specific reactions to stress, overcrowding, sensory deprivation, reaction to drugs and countless other situations. Many of the sound principles of psychology were first developed through the use of laboratory animals. At Utah State the Psychology Department maintains both human and animal laboratories to help students appreciate the problems that those interested in the study of psychology must become acquainted with.

Psychologists are working in every area of human endeavor. General fields include research, teaching, industry, human engineering, clinics and mental hospitals, aerospace agencies, the armed forces, and other government agencies. They share their findings through an extensive array of professional journals and books. Students interested in the scientific study of behavior through psychology will find considerable satisfaction in this field. One should not look to psychology as a singular approach to man's behavior. Companion majors or minors with Psychology are Anthropology, Sociology, Physiology, Mathematics, Philosophy, Business, Ecology, and Chemistry of Physics. The nature of the course of study to be followed depends on the student's primary interests.

*In College of Education.

The Department of Psychology has arrangements with schools, social welfare agencies, juvenile courts, and other institutions by which graduate students and some Seniors can have practical experience.

Undergraduate Study

Lower Division

Since psychologists often work closely with other scientists, superior preparation involves training in Physical, Biological and Social Sciences as well as in Mathematics and Literature. In completing group requirements it is recommended that course work include Physiology, History or Political Science, Sociology, Literature, basic course work in Physics and College Algebra with additional Mathematics courses. The student is encouraged to go beyond the minimum "general education requirements" in order to understand better the broad implications of scientific endeavor.

Upper Division

Requirements for a Psychology major consist of the broad lower division preparation, a supporting minor area and a minimum of 45 credits in Psychology. The 45 or more credits in Psychology include the core courses and at least one course from each of the four areas listed below. The balance of course work must be upper division courses in Psychology approved by the student's adviser.

Psychology Core: Psychology 101 General Psychology, which is a prerequisite for all major and upper division courses; Psychology 141, Analysis of Behavior, Psychology 110, Human Development: General; or Psychology 111, Human Development; Experimental Child; Psychology 380, Statistics; and Psychology 409, History of Psychology. No other courses can be used to satisfy the 14 core credits.

At least one course must be selected from each of the following four areas:

1) Learning: Psychology 340, 342, or 349.

2) Physiological: (Physiology 130 is a prerequisite) Psychology 345, 346, or 546.

3) Analysis and Measurement: Psychology 441 or 530.

4) Social and Personality; Psychology 321, 351 or 421.

Additional undergraduate course work may be selected to complete the 45-credit requirement for a major.

A minor in Psychology (18 credits minimum) must include the 14 credits of core courses and two courses selected from those listed under the four areas mentioned previously.

Graduate Study

Master of Science and Master of Arts in Psychology. The master's degree is offered with specialization in the following areas: 1) General, 2) Child and Developmental, 3) Educational, 4) School, 5) Counseling, 6) Animal Behavior, 7) Physiological, 8) Experimental, 9) Social, and 10) Learning and Motivation. The master's program in both School Psychology and Counseling is designed to meet the State of Utah requirements for certification in these areas.

A candidate for these degrees is required to take a comprehensive examination administered by the department prior to commencement of thesis. For further

detailed information regarding examinations and for brochures describing the program of interest, the student must contact the head of the Department of Psychology.

The department offers the EdD and the PhD in Psychology. Specialization is possible in the following areas: 1) Experimental, 2) Child and Developmental, 3) Counseling, 4) Learning and Motivation, 5) Social. Each program consists of 135 credits above BA including practical, dissertation, and course work. Specific descriptions of these programs are available on request from the Department of Psychology.

The student should note the following general requirements of the PhD programs and request additional information from the department head if needed. 1) Admitted students will be required to write departmentally administered, comprehensive qualifying examinations within one year of admission to the program. 2) A series of four oral comprehensive exams must be passed (in addition to the qualifying exams) over a two-year period. 3) The student must prove his proficiency in a foreign language either via examination through the Department of Languages and Philosophy or by course work in a scientific area which satisfies School of Graduate Studies requirements. The student may elect to replace this language requirement with nine credits (passed with a grade of "B" or better) of course work in upper division or graduate classes in no more than two areas comprising material he would not otherwise have studied in his degree program as approved by his graduate committee. For suggested areas of study the student must contact the department head. 4) An original piece of research comprising a doctoral dissertation must be conducted, put in final form, and successfully defended.

Psychology Courses

To help students plan programs the Department of Psychology has used the following code for the last two digits:

General Courses	00 to 09
Child and Developmental	10 to 19
Counseling and School Psychology	20 to 39
Experimental	40 to 49
Industrial and Social	50 to 59
Educational	60 to 69
Services Courses	70 to 79
Research-Statistics and Seminar	80 to 89
Readings, Thesis and Dissertations	90 to 99

Undergraduate

70. (20) Spelling Clinic. Application of programmed techniques to adult spelling improvement. Individual instruction based on diagnostic testing. (1F) **Stone**

71. (22) Basic Reading Efficiency. Stresses word attack skills, speed-reading, and tutorial procedures to meet individual differences. (1F, W, Su) **Staff**

101. (53) General Psychology. Principles of behavior of organisms, including: scientific methodology in psychology, biological basis of behavior, conditioning and learning, perception and thought, child development, personality, abnormal psychology, and industrial psychology. For any lower division student. (5F, W, Sp, Su) **Staff**

110. (100) Human Development: General. An introductory survey of human physical and psychological development from birth to maturity. Prerequisite: Psych 101. (3F, W, Sp) **Casto, Osborne**

111. (101) Human Development: Experimental Child Psychology. Introduction to the experimental analysis of behavior as applied to the developing child. Prerequisite: Psych 101. (3F, W, Sp) **Osborne**

141. (71) Analysis of Behavior: Basic Principles. A laboratory course of the scientific methods used in the study of behavior. Meets daily. (3F, W, Sp, Su) **Crossman**

173. (60) Personal Study Efficiency. A highly individualized course designed to help the student apply correct psychological principles to his own approach to learning. (1F, W, Sp) **Staff**

175. (80) Reading and Study Skills. A practical course, highly individualized, designed to aid in improving the efficiency or reading and study skills. Individual appointment arranged. (2F, W, Sp) **Stone**

270. (145) Mental Hygiene. Designed to promote understanding of emotional and social adjustments as a basis for guiding children and young people in the school situation. Prerequisite: Psych 101. (3W) **Cook, Sharp**

313. (123) Human Development: Exceptional Children. Development and behavior characteristics of exceptional children. Prerequisite: Psych 110 or 111. (3F, W, Sp, Su) **Staff**

320. (129) School Guidance Services. An introduction to public school pupil personnel services. Designed to introduce undergraduate teaching majors to guidance services. (3F, Su) **Allen**

321. (140) Abnormal Psychology. A descriptive and explanatory study of the varieties of mental abnormality psychoses, psychoneuroses, and minor maladjustments — their courses, methods of treatment, and the mental hygiene approach in preventing psychological maladjustments. Prerequisite: Psych 101. (3F, W, Sp) **Peterson, Sharp**

340. (127) Psychology of Learning. Stresses mediation processes in thinking, cognition, concept learning, transfer, and hypothesizing as elements of complex learning and problem solving. (3W) **Stone**

342. (128) Thinking and Verbal Learning. Stresses mediational processes in thinking, cognition, concept learning, transfer, and hypothesizing as elements of complex learning and problem solving. (3W) **Crossman**

345. (170) Perception and Psychophysics. Analysis of sensory-determined behavior and the methods, findings and principles of sensory communication. Prerequisite: Psych 101. (3W) **Cheney**

346. (174) Sensory Basis of Behavior. An introductory course in the anatomy and physiology of receptor mechanisms and the CNS basis of sensation. Prerequisites: Physiology 130, Psych 141. (3F) **Cheney**

349. (172) Motivation. An introduction and examination of pertinent theories of motivation with special emphasis on the role of motivational factors in human behavior and learning. (3W, Sp, Su) **Priollaud**

351. (161) Social Psychology. A study of the individual in society. This course will expose the students to some of the problems, theories and methods of social psychology. Efforts will be made to relate reading assignments to current social issues. Prerequisite: Psych 101. (3F, W, Sp, Su) **Priollaud**

360. (33) Human Development: for Educators. A course designed to help educators utilize the principles of psychology as applied to the developing child. Prerequisite: Psych 101. (F, W, Sp, Su) **Staff**

366. (106) Educational Psychology. Principles of learning in teaching, the abilities and other relevant characteristics of children and adolescents on the basis of which elementary and secondary teachers can evaluate and/or develop conditions of effective learning. Prerequisite: Psych 101. (3F, W, Sp, Su) **Frandsen, Nielsen, Stone**

375. (120) Improving Personal Reading Efficiency. Designed to help adults improve their methods of reading. Stresses improvement in organization and comprehension skills, and the ability to flexibly adapt speed to the material and needs of the reader. (3Su) **Stone**

380. (112) Statistical Methods. Elementary study of statistical procedures in handling test scores and other data, and of the concepts needed to read current educational and psychological literature. (3F, W, Sp, Su) **Checketts, Sharp**

409. (191) History of Psychology. The evolution of psychology to the 20th century. Prerequisite: Psych 100. (3F) **Crossman, Sharp**

421. (180) Personality Theory. An explanatory study of various personality theories, their origin, and approaches to the understanding of human behavior. (3F, W, Sp) **Morrill, Sharp**

441. (171) Analysis of Behavior: Methodology. Introduction to the techniques of single subject design. Prerequisite: Psych 141. (3W, Sp) **Crossman, Powers**

442. (173) Analysis of Behavior: Instrumentation. The design of programs used in conducting psychological experiments. Prerequisite: Psych 141. (2Sp) **Staff**

524. (197) Workshop in Guidance. Designed for undergraduate or graduate level students. Serves as an overview of the varied skills needed by counselors in different settings. (1-6Su) **Bertoch, Wright**

530. (181) Psychometrics. Evaluation, interpretation, and uses of tests of intelligence, aptitudes, interest, personality, and adjustment. Prerequisites: Psych 101, 380. (5F, Su) **Frandsen, Nielsen**

546. (175) Physiological Psychology. Introduction to the neural and biochemical substrates of behavior. Emphasizes the structure and function of the nervous system. Prerequisite. Physiology 130 or equivalent. (3F, Sp, Su) **Cheney**

555. (155) Psychology of Business and Industry. Methods and principles of psychology as appled to the analysis and solution of problems in business and industry. (3F, Sp) **Cragun**

556. (156) Problems in Industrial Psychology. An analysis of current issues, problems, methodologies, and research in industrial and business psychology. Prerequisites: Psych 380 or equivalent, 555. (3W) **Cragun**

568. (298) Techniques of Programmed Instruction. Analysis of program efficiency based on a study of curricular sequence. Review of research and laboratory work on styles of program construction. (3W, Su) **Stone**

590. (117) Readings and Conferences. Individual discussion and intensive study of a particular problem or area. Prerequisite: Instructor's consent. (1-3F, W, Sp, Su) **Staff**

591. (116) Independent Research. Experiments and demonstration projects are conducted and reported. Prerequisite: Instructor's consent. (1-3F, W, Sp, Su) **Staff**

593. (118) Teacher Training Practicum. Training and practical experience in applying the techniques of contingency management to teaching. Prerequisite: Instructor's consent. (2F, W, Sp, Su) **Staff**

Graduate

608. (227) Learning Theory. An integration and synthesis of the literature. A comparison and evaluation of alternate operational and theoretical explanations of learning. (3F) **Stone**

609. (new) Systems of Psychology. An examination of various schools of psychology within the twentieth century. Will include mention of structuralism but will emphasize functionalism, associationism, behaviorism, Gestault theory, and psycho-analysis. Prerequisite: Psych 409. (3F) **Crossman, Sharp**

610. (205) Human Development: Child Psychology. The roles of maturation, learning, and environmental conditions in child development from birth to adolescence. Prerequisite: Psych 110. (3W, Su) **Casto**

611. (201) Human Development: Experimental Child Psychology. A readings course in the experimental analysis of child behavior. The student is responsible for an independent study. Prerequisite: Psych 111. (3F, W, Sp) **Osborne**

614. (202) Human Development: Adolescence. The characteristics of the adolescent and his psychological, educational and adjustmental problems are discussed in detail. Prerequisite: 110 or 111. (3F, Sp, Su) **Bergeson, Cook**

618. (235) Practicum in Child Psychology. Observational analyses and techniques are employed in the examination of the behavior of children. Prerequisite: Instructor's consent. (3F, W, Sp, Su) **Casto, Osborne**

619. (238) Practicum in Child Psychology. A continuation of Psych 618. Direct experience with children will be gained in either the play therapy or behavior modification setting. Prerequisite: Instructor's consent. (3F, W, Sp, Su) **Casto, Osborne**

620. (283) Principles of Counseling. Principles and techniques of counseling students on problems of curriculum planning and vocational choice, on improving methods of study, and emotional and social adjustment. (3F, Su) **Bertoch, Morrill, Wright**

621. (284) Theories of Counseling. An advanced study of the theories of counseling, to develop greater understanding of and a more effective approach to counseling. Prerequisites: Psych 530, 620. (3F, Su) **Bertoch, Morrill, Wright**

622. (285) Group Processes. An introduction to various group methods of approaching both process- and task-oriented groups. Class structure is primarily didactic with some orientation toward various group rating scales. (3W, Su) **Bertoch, Morrill, Wright**

624. (297) Workshop in Guidance. A faculty or part of a faculty in a school district studies, evaluates, and attempts to improve the use of the school's resources for more effective guidance in its several phases. (3F, W, Sp) **Bertoch, Wright**

625. (237) Vocational Guidance Workshop. Latest methods related to vocational counseling techniques and classroom approaches to teaching vocational information and skills. (1Su) **Bertoch**

626. (257) Career Information Services. A survey of materials describing the world of work, factors involving workers and their careers, and methods of utilizing career information with classes and groups. (3F, Su) **Bertoch**

627. (267) Theories of Vocational Development. Study of various theories of vocational development and their application to career choice. Includes a short practicum experience in vocational counseling plus field trips to industries. Prerequisite: Psych 626. (3W, Su) **Bertoch**

628. (229) Administration of Psychological Services. The structure and role relationships of psychological services within institutional settings and in relationship to other administrators and professionals. Prerequisite: Psych 626. (3Su) **Nielsen, Wright**

630. (221) Individual Differences. Investigation of various group instruments relative to personality, interests, aptitude, and IQ tests. Administration and diagnosis of group testing batteries is emphasized. Prerequisite: Psych 530. (3F, Su) **Bertoch, Morrill**

631. (282) Individual Intelligence Testing. Techniques of individual testing, including intensive practice in the administration and interpretation of the Stanford - Binet and Wechsler's Intelligence Scale for Children, in the examination of school-age children; and the Wechsler's Adult Intelligence Scale for use with adolescents and adults. Prerequisite: Psych 530. (3W, Su) **Casto, Sharp**

632. (282A) Projective Techniques. The evaluation of the dynamics of human adjustment and the common projective methods of revealing motives, attitudes and adjustment mechanisms. Prerequisites: Psych 530, 630, 631. (3F) **Morrill, Nielsen**

635. (288) Practicum in Counseling (Introductory). The student investigates his own personality and his relationships with other people in a group setting. Required of all students entering the Counseling Psychology program. (3F, W, Sp, Su) **Staff**

636. (288S) Practicum in Counseling. Supervised practice in counseling in elementary or secondary schools, in the University or in clinical or guidance agencies. Prerequisites: Psych 530, 631.

Registration for the practicum must be made one quarter in advance in the department. A laboratory fee of $10 is required and payable at the USU Bookstore.
(3F, W, Sp, Su) **Staff**

637. (289) Practicum in Testing. Supervised practice in psychological testing in elementary or secondary schools, in the University or in clinical or guidance agencies. Prerequisite: Psych 631. (3Sp) **Casto, Nielsen**

641. (271) Analysis of Behavior: Operant Conditioning. A cross-section of current topics in operant conditioning. Prerequisite: Psych 441. (3W) **Crossman, Powers**

646. (274) Sensory Basis of Behavior. An advanced course in neural and biophysical basis of sensation. Current research at cellular and gross physiological levels. Research is required. Prerequisites: Psych 346, 546 or equivalent. (3F, Sp, Su) **Cheney**

647. (276) Ethnology and Comparative Psychology. The study of the behavior of organisms, including man, by means of the comparative method. A research project is required. Prerequisite: Psych 441, Wildlife 148. (3Sp) **Crossman, Cheney**

651. (261) Social Psychology. The students will first review the literature on selected current topics in Social Psychology (i.e., audience effects, coaction effects, increase in risk taking in group decision, etc.). They will then prepare a research proposal and present it repeatedly to their classmates for constructive criticism. Prerequisites: Psych 101, 380. (3W) **Priollaud**

653. (263) Attitudes and Attitude Measurements. Steps required to develop commonly used types of scales for attitudes toward relevant targets. The most likely scale will be a Likert Scale, and a Thurstone Scale. Some knowledge of Osgood's Sematic Differential will be also acquired. Prerequisites: Psych 101, 380. (3Sp) **Priollaud**

654. (264) Experimental Social Psychology. Students will conduct studies involving human subjects on the campus, following procedures given by a laboratory manual. Discussions of the ethical problems of deception will be conducted before any data are collected. Prerequisite: Psych 101. (3W) **Priollaud**

655. (272) Work Motivation. Students will review various theories of motivation applied or applicable to the business world and will present reports in class. The only prerequisite is a willingness to explore the potential relevance of theories to the real world.
(3W, Sp) **Priollaud**

666. (200) Principles of Learning in Teaching. A study of learning theory and of experiments in psychology and education for the purpose of developing a set of learning principles as a guide to creating conditions for effective learning to both elementary and secondary schools. Prerequisite: Psych 101.
(3F, Sp, Su) **Stone**

668. (310) Diagnosis of Learning Difficulties. Principles from educational psychology applied to the diagnostic study of the difficulties students have in learning reading and other subjects. (3W, Su) **Stone**

680. (212) Statistical Methods and Designs. Analysis of variance and covariance, varied correlation techniques, partial and multiple correlation, and non-parametric methods. Prerequisite: Psych 380 (3W, Su)
Checketts, Shaver

681. (215) Seminar. An in-depth discussion of current or special topics. (1-3F, W, Sp) **Staff**

690. (214) Readings and Conferences. Individual discussion and intensive study of a particular problem or area. Prerequisite: Instructor's consent. (1-3F, W, Sp, Su) **Staff**

691. (new) Independent Research. Experiments and demonstration projects are conducted and reported. Prerequisite: Instructor's consent. (1-3F, W, Sp, Su) **Staff**

697. (217) Thesis. Credit arranged.
(F, W, Sp, Su) **Staff**

710. (305) Child Psychology. A critical and creative approach to the study of the factors affecting child development, including the consideration of theories, experiments, and new studies. Prerequisite: Psych 610. (3W)
Casto

711. (301) Experimental Child Psychology. Research readings in the experimental analysis of child behavior with emphasis on the development of research techniques with children. The student will generate a research proposal. Prerequisite: Psych 611. (3F, W) **Osborne**

712. (302) Experimental Child Psychology. Development and accomplishment of independent reseach projects dealing with child behavior. Prerequisite: Psych 711. (3W, Sp) **Osborne**

713. (323) Exceptional Children. A critical and creative approach to the study of the characteristics of exceptional children. Prerequisite: Psych 313. **Staff**

720. (386) Problems in Counseling. Individual case study approach emphasizing treatment and remediation problems. Prerequisite: Psych 733. (3Sp) **Bertoch, Wright**

721. (280) Personality. A comparative analysis of theoretical approaches to personality. Both theory and empirical investigation will be employed as a basis for arriving at integrated concepts of the nature and development of personality. (3W, Sp) **Morrill, Sharp**

722. (286) Group Processes. An advanced group course stressing group research and participation in observation and leading groups. Prerequisite: Psych 622. (3Sp) **Morrill, Wright**

732. (285) Advanced Projective Techniques. Intensive study of projective methods featuring the more complex instruments frequently used for assessing personal adjustment. Prerequisite: Psych 632. (3W) **Morrill, Nielsen**

733. (281S) Psychodiagnosis. Individual case study approach emphasizing complete diagnostic evaluations. Exploration of mental illness from the family constellation point of view. Prerequisite: Psych 732. (3Su) **Bertoch**

734. (381) Psychometric Theory. Principles of psychometrics as applied in the construction, evaluation, interpretation, and uses of tests of abilities, achievements, interests, and personality. (3W) **Frandsen**

735. (290) Internship in Counseling. A one-quarter internship for prospective counselors in approved school systems or other agencies of Utah and Idaho. (In some settings the trainee may receive a stipend for full-time work.) The intern will be placed in a field setting appropriate to his anticipated employment goals, and will be supervised by a qualified person in the field setting and by the Counselor Education staff of the University.

736. (387) Clinical Internship. A clinical internship for doctoral candidates in which advanced testing, diagnosis, and the writing of psychological protocols is practiced in mental hospitals, mental health clinics, and child guidance centers. Administration and interpretation of mental tests, projective tests, and aptitude tests will be supervised by clinical psychologists in the center and by departmental staff. Financial support by the center for selected candidates will be available. Approved centers: Cache County Mental Health Clinic; Utah State Industrial School, Ogden; Wyoming State Mental Hospital, Evanston; Gateway Mental Health Center, Pocatello, Idaho; Eastern Idaho Community Mental Health Center, Idaho Falls, Idaho. (3-6F, W, Sp, Su) **Bertoch, Casto, Sharp**

737. (388) School Psychology Internship. Supervised practice in providing psychological services in a school setting. (3F, W, Sp) **Casto**

746. (275) Physiological Psychology. Neuroanatomical, neurophysiological and biochemical basis of behavior. Literature in neurophysiology is surveyed, and a research project is required. Prerequisite: Psych 546, or equivalent. **Cheney**

766. (300) Psychological Foundations of Education. From a study of the psychological-educational theories and supporting experiments on motivation, learning, abilities, interests, personality, interpersonal relations, teachings, and evaluation, students will formulate an integrated theory of teaching. (3W) **Frandsen**

781. (315) Doctoral Colloquium. A colloquium on advanced theories and research in psychology. Required of all PhD and EdD candidates. (3F, Sp) **Staff**

790. (314) Readings and Conferences. Individual discussion and intensive study of a particular problem or area. Prerequisite: Instructor's consent. (1-3F, W, Sp, Su) **Staff**

791. (new) Independent Research. Experiments and demonstration projects are conducted and reported. Prerequisite: Instructor's consent. (1-3F, W, Sp, Su) **Staff**

797. (317) Dissertation. Credit arranged. (F, W, Sp, Su) **Staff**

799. (400) Continuing Registration. Graduate students who have received maximum thesis credit, but who have not completed the thesis or dissertation, must enroll for a minimum of three credits, until the degree is completed. If the student does not comply, his candidacy may be suspended and his supervisory committee dissolved. (3F, W, Sp, Su) **Staff**

*Department of

Range Science

Head: Professor C. M. McKell
Office in Forestry-Zoology 181

Professors Thadis W. Box, David W. Goodall, Karl G. Parker, Arthur D. Smith

Associate Professor Neil E. West

Assistant Professors James E. Bowns, Martyn M. Caldwell, George B. Coltharp, Gerald F. Gifford, John C. Malechek, John P. Workman

Adjunct Associate Professor Jack F. Hooper

Collaborators Donald M. Beale, Alvin T. Bleak, Paul W. Conrad, William A. Laycock, P. E. Packer, Alvin C. Hull

Degrees: Bachelor of Science (BS), Master of Science (MS), Doctor of Philosophy (PhD)

Majors: Range Science, Forest Range Science, Range Watershed Management

Graduates are qualified for such positions as forest ranger, soil conservationist, range manager, or range conservationist, under the U.S. Civil Service Commission, with such federal agencies as the Forest Service, Soil Conservation Service, Bureau of Indian Affairs, and Bureau of Land Management. Present concerns for environmental quality and greater use of rangelands for purposes in addition to grazing make a career in range management an attractive employment area. State land management and both federal and state research opportunities are also available.

Range Science graduates also may enter private work, such as operating a livestock ranch, technical foreman for livestock companies, adviser to land management companies, and land appraiser.

Undergraduate Study

Students in the Department of Range Science must complete the course work listed below during the Freshman, Sophomore and Junior years, in addition to University group requirements.

Course outline for the first three years of the Range Science option.

FRESHMAN YEAR

Courses	Credits F	W	Sp
English 101, 102, 103	3	3	3
Biology 120, 121, 122	5	5	5
Chemistry 111, 112, 141[1]	5	5	
Math 242			5
Forest Sci 101, Range Sci 101, Wildlife 100	1	1	1
PE, MS, AS	1	1	1
Totals	15	15	15

SOPHOMORE YEAR

	F	W	Sp
Geology 110	5	5	
Physics 120		5	
Soils 358			5
Meteorology 517			4
Economics 200		5	
Statistics 351	5		
Botany 420			5
Group Requirements and Electives	8	3	4
Totals	18	18	18

*In College of Natural Resources.

[1]Optional.

JUNIOR YEAR

	F	W	Sp
Botany 521	5		
Range 384, 385	6		
Range 340		3	
Range 341			4
Range 342, 343		3	3
Botany 440		5	
Animal Science 440, 441 and one additional course	3	3	5
Soils 514			5
Group Requirements and Electives	4	4	1
	18	18	18

Senior Year. A student who completes the first three years of Range Science will consult with his faculty adviser[1] to work out a fourth year of studies suitable to his interests, capabilities and career objectives in one of several areas of competence such as General Range Management, Game Range Management, Forest-Range Management, Range Watershed, Range Resource Economics, Range Ecology, Range Ecophysiology, Range Extension, etc. Senior year emphasis will be placed on education in the social sciences and communicative skills which will prepare students to deal with "people" problems in Range Resource Management. Senior level courses in Range Science are recommended to students wishing greater depth in particular areas of Range Management.

All Senior students will be required to take the following classes: English 301, Expository Writing; Range Science 491, Range Issues Seminar; Range Science 496, Range Field Problems.

Students desiring additional work in Range Science should consider the following courses: Range Science 563, Range Improvement; 565, Range Resource Economics; 380, Watershed Management; 567, Wildlife Range Relationships; 495, Range Problems; 568, Range Land Appraisal.

[1]Students desiring to prepare for advanced work in certain areas such as Range Watershed Science, Range Ecophysiology or Range Ecology should consult with their adviser for certain additional courses recommended in the first three years.

Forest-Range Option

Forest-Range Science is the program which trains the student for work in the U.S. Forest Service.

Students desiring to graduate in the Forest-Range option should follow the first two years of the Range Science curriculum. The Junior and Senior years of study emphasize Forestry and Range courses.

Range Watershed Management Option

Range Watershed Management involves training in wild-land hydrology, soil conservation, and administration of watersheds.

Students will follow the freshman year of the Range Science curriculum.

SOPHOMORE YEAR

Courses	Credits F	W	Sp
Botany 440		5	
Geology 110	5		
Physics 120		5	
Soils 358			5
Meteorology 517			5
Economics 200		5	
Applied Statistics 351	5		
Botany 420			5
Group Requirements and Electives	7	0	2
Totals	17	15	17

JUNIOR YEAR

	F	W	Sp
Botany 521	5		
Range 342, 343		3	3
Range 384, 385	6		
Range 340		3	
Range 341			4
Watershed 380, 480		3	3
Animal Science 440, 441	3	3	
Soils 514			5
Group Requirements and Electives	3	3	3
Totals	17	15	18

SENIOR YEAR

	F	W	Sp
Watershed 481	4		
English 301	3		
Range 496	3		
Range 491			2
Watershed 489		1	
Group Requirements and Electives	8	16	15
Totals	18	17	17

Balance of the Senior year is left to individual choice.

Range Science Minor

The following courses in Range Science are suggested for students who wish to minor in this field (requirements subject to approval by the Range Department): Range 384, 385, General Ecology; Range 340, Range Management; Range 341, Range Science Methods; Range 342, 343, Range Ecosystems; Range 565, Range Resource Economics.

Graduate Study

The Master of Science degree and the Doctor of Philosophy degree are offered in Range Science and related fields such as Plant Ecology, Watershed Science, Range Economics, and Game-Range Management. The program of instruction and research leading to these degrees is available only to students meeting high scholastic standards and who are accepted by the department staff. Students desiring entrance to these graduate programs should contact the department head for information concerning eligibility.

Cooperation with other departments and research centers of the University and with government collaborators permits strong graduate programs in all phases of range-related sciences. Particular mention should be made of the University's Ecology Center, in which the Range Department is very active; the Watershed Science Unit, which administers the forest and range hydrology programs; the Utah Agricultural Experiment Station, which has a full program in both applied and basic range research; the Center for Water Resources Research, sponsoring range watershed research; the Cooperative Utah State Fish and Game Division program in big-game range research, and the U.S. Forest and Range Experiment Station, which maintains a research center on the campus for range and watershed research.

There are available to graduate students a number of assistantships and fellowships which will defray most of the costs of attending school, including exemption from non-resident tuition fees. The department qualifies under the National Defense Education Act, University Fellowship, and National Science Foundation programs. Teaching assistantships and research assistantships, which are attached to existing faculty research programs, involve part-time work for the department.

Students interested in financial aid for graduate training should write to the department head for details early in the school year preceding initiation of graduate work.

Range Science Courses

Undergraduate

101. (1) Elements of Range Science. (1W) **Staff**

298. (98) Range Analysis. Field identification of summer range plants. Methods and techniques of vegetation analysis. Practice in range allotment analysis. (1 Summer Camp) **Staff**

340. (140) Range Management. A foundation course in the application of Range Science principles to the management of rangelands. Emphasizes range history, multiple use, ecology and physiology of range productivity and utilization, systems of grazing management and range improvement. (3W) **Staff**

341. (141) Range Science Methods. Description and measurement of features of range ecosystems and their utilization. One four-hour lab per week. Saturday field trips in conjunction with Range 343. Prerequisites: Taxonomy of Wildlife Plants, General Ecology, Range 340, 342, 343 (concurrently). (4Sp) **Staff**

342. (142) Forest and Tundra Ecosystems. Structure, function, dynamics and multiple use management of forest and tundra ecosystems with emphasis on those of North America. Prerequisites: General Ecology, Introductory Soils, Bioclimatology, Taxonomy of Wildland Plants. (3W) **West**

343. (143) Grassland and Desert Ecosystems. Structure, function, dynamics and multiple-use management of grassland and deseret ecosystems with emphasis on those of North America. Saturday field trips. Prerequisites: General Ecology, Introductory Soils, Bioclimatology, Taxonomy of Wildland Plants. (3Sp) **West**

384. (184) General Ecology. Role of heredity and environment in plant behavior; plant succession, competition and indicators; analysis of habitat factors influencing plant growth and distribution. Prerequisite: Plant Taxonomy. Lab fee $1. (5F, Sp) **Caldwell**

385. (185) General Ecology Lab. (1F, Sp) **Caldwell**

490. (new) Readings and Conferences. Time and credit arranged. **Staff**

491. (191) Range Issues Seminar. Supervised discussion and review of range resource problems. Prerequisite: Senior classification. (2Sp) **Coltharp**

495. (195) Range Problems. Individual study and research upon selected problems in range science and related subjects. Prerequisite: Faculty approval. (1-3F, W, Sp, Su) **Staff**

496. (196) Range Field Problems. Field study of range management operations. Lab fee $50. (3F) **Staff**

563. (163) Range Improvement. Principles and planning for improving rangelands. Methods and problems involved in seeding rangelands, removing brush, improving stock watering facilities, and fencing ranges. Terracing water spreading and use of dams on range land. Prerequisite: Range 340. (3W) **McKell**

565. (165) Range Resource Economics. Resource and production economics, range land utilization, organization of cattle and sheep industry, and value of range forage. (3F) **Workman**

567. (167) Range Wildlife Relationships. Competitive and complementary relationships between wildlife and other uses of rangelands: competition for forage between domestic livestock and big game; impacts of grazing upon wildlife populations; effects of cultural practices and vegetation manipulation programs on wildlife; human conflicts among users of rangelands. Field trips may be substituted for an equivalent time in lecture periods. Prerequisites: Range 340, General Ecology, and Senior standing. (3F) **Malechek**

568. (168) Range Land Appraisal. Prerequisite: Range Resource Economics or equivalent. (3Sp) **Workman**

Graduate

*610. (210) **Plant Autecology.** Advanced study of effects of factors of the environmental complex upon native plants. Prerequisites: General Ecology, Plant Physiology. Two lectures, one lab. (3W) **Caldwell**

*611. (211) **Plant Synecology.** Development, structure, and classification of native vegetation. Prerequisite: Introductory General Ecology. Statistics suggested. (3W) **West**

615. (215) **Plant Geography. Distribution of native vegetation of the world in relation to environment. Offered alternate years. Prerequisite: General Ecology. (3W) **West**

621. (221) **Plant Ecophysiology. Advanced study of the integration of plant ecology and physiology in analyzing response of native plant species to their environment. Offered alternate years. Prerequisites: Range 384, Botany 440. (3W) **Caldwell**

631. (231) Systems Ecology. Development and application of theoretical and mathematical models in the study of ecosystems. (3W) **Goodall**

665. (281) Advanced Range Economics. Economic factors affecting land management practices, particularly rangelands and range operations. Prerequisite: Range Resource Economics (2Sp) **Workman**

680. (207) Graduate Seminar. Review of current research by graduate students and faculty. (1F, W, Sp) **Staff**

684. (204) Land Use Seminar. Current problems and practices in land resource allocations and administration with special emphasis on the western range. (2F) **Smith**

*685. (205) **Seminar in Range Nutrition.** Prerequisite: Animal Nutrition. (3W) **Malechek**

686. (206) **Research Methods. Prerequisite: Statistics. (3F) **Staff**

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*Taught 1971-72.

**Taught 1972-73.

690. (202) Readings and Conferences. (1-3F, W, Sp, Su) **Staff**

697. (200) Range Thesis MS. Original research and study on a problem in range science. (1-15F, W, Sp, Su) **Staff**

699. (400) Continuing Graduate Advisement, MS. **Staff**

797. (200) Range Thesis. Original research and study on a problem in range science. (1-15F, W, Sp, Su) **Staff**

799. (400) Continuing Graduate Advisement, PhD. **Staff**

Watershed Science Unit

Watershed Science is concerned with water-oriented aspects of natural resource management, with emphasis on wildland hydrology. Precipitation patterns, interception, overland flow and runoff, sediment production, water use by plants, and water yield are just a few important wildland water resource problems that must be examined to meet ever new and challenging demands for water quantity and quality. Demand for individuals who aspire to work in this field is high.

The Watershed Science Unit, in the College of Natural Resources, administers programs in Watershed Science and Watershed Management at the undergraduate and graduate levels. Options are available, emphasizing Watershed Management in conjunction with either a Range or Forestry background.

WATERSHED SCIENCE CURRICULUM

FRESHMAN YEAR

Courses	Credits F	W	Sp
English 101, 102, 103	3	3	3
Math 220, 221, 222	5	5	5
Biology 120, 121, 122	5	5	5
PE or ROTC	1	1	1
[1]Electives	3	3	3
Totals	17	17	17

SOPHOMORE YEAR

	F	W	Sp
Physics 111, 112	5	5	
Chemistry 121, 122	5	5	
Economics 200		5	
Soils 358			5
Botany 440			5
[1]Electives	5		5
Totals	15	15	15

JUNIOR YEAR

	F	W	Sp
Applied Statistics 351, 432	5	5	
Geology 560	5		
English 303 or		3	
Watershed Science 380, 480		3	3
Forest/Range Science 384, 385			6
[1]Electives	7	5	8
Totals	17	16	17

SENIOR YEAR

	F	W	Sp
Range Science 340		3	
Watershed Science 481, 489	4	1	
Wildlife Resources 300		3	
Civil Engineering 550	4		
Forest Science 444			5
Soils 514			5
Civil Engineering 443, 444		4	3
[1]Electives	8	6	3
Totals	16	17	16

Watershed Science Courses

Undergraduate

380. (180) Watershed Management. Principles and methods involved in managing range and forest land for optimum production and regulation of water yields and for maintaining soil stability. Two lectures, one lab. Lab fee $4. Saturday field trips may be scheduled. (3W) **Coltharp**

385. (185) Watershed Field Trip. (1F, W, Sp, Su) **Staff**

480. (190) Watershed Instrumentation. Application of data collection devices and systems to measurements of wildland watershed parameters. Includes experience in installation and operation of hydro-meteorologic equipment and discussion of techniques for interpretation and analysis of data. Two lectures, one lab. (3Sp) **Hart**

[1]Electives are to be used to satisfy the University general education (group) requirements for 25 credits in the Social and Behavioral Sciences and Humanities. Remaining elective credits may be used to take any other courses of the student's choice.

481. (191) Forest and Range Hydrology. Role of forest and range vegetation in determining the hydrolic function of a watershed; natural storage phenomena of the forest land surface and methods of modifying this. (4F) **Hart**

489. (198) Watershed Science Problems. Individual study and research. Credit arranged. (F, W, Sp, Su) **Staff**

Graduate

646. (275) Snowpack Management. Study of snow accumulation, dissipation and melt as governed by thermodynamic and aerodynamic principles and as related to land management practices in the snow zone. (2W) **Gifford**

647. (276) Snow Hydrology. See Civil Engineering 647. (3Sp) **Fletcher**

682. (202) Watershed Science Seminar. (1W) **Schultz**

690. (208) Watershed Science Problems. Individual study and research. Credit arranged. (F, W, Sp, Su) **Staff**

697. (240) Watershed Science Thesis. (1-15F, W, Sp, Su) **Staff**

699. (400) Continuing Graduate Advisement. (3F, W, Sp, Su) **Staff**

775. (280) Watershed Analysis. Advanced study of principles, technical problems, and procedure encountered in managing watersheds. (3Sp) **Gifford**

782. (202) Watershed Science Seminar. (1W) **Schultz**

797. (240) Watershed Science Thesis. (1-15F, W, Sp, Su) **Staff**

799. (400) Continuing Graduate Advisement. (3F, W, Sp, Su) **Staff**

**Department of*

Secondary Education

Head: Professor Kenneth C. Farrer
Office in Education 206

Professors Ross R. Allen, Eldon Drake

Professor Emeritus John C. Carlisle

Associate Professor Orson Tew

Assistant Professors Richard Knight, Walter L. Saunders, William Strong

Degrees: Bachelor of Arts (BA), Bachelor of Science (BS), Master of Arts (MA), Master of Science (MS), Master of Education (MEd), Doctor of Education (EdD)

Major: Secondary Education

Junior and senior high schools offer a rewarding career for men and women who are interested in teaching in two closely related subjects and who have a desire to understand and work with teenagers. Although teaching in the secondary schools makes great demands upon a teacher, he will find it to be richly rewarding in mental stimulation. Teaching offers one an opportunity to work with other adults of similar tastes and values. Capable secondary school teachers enjoy maximum job security with long-range career opportunities and continually increasing financial rewards.

An unprecedented number of opportunities for on-the-job, summer, or graduate training are available for today's young teachers, and more are in the offering. National and regional workshops are available in many subjects.

*In College of Education

Overseas employment affords new opportunities for those wishing to combine travel and teaching. Graduate work with teaching fellowships is available at most universities. Research and development grants are now available under the Elementary and Secondary Education Act of 1965. Through new teaching media and experiments in class and school organization, young teachers find ways to improve their skills of instruction.

The function of the Department of Secondary Education is to aid in the preparation of teachers, supervisors, curriculum specialists, and other professional personnel for careers in secondary education.

Undergraduate Study

The department cooperates with other departments of the University with graduate students with secondary teaching majors in providing the professional education courses necessary for certification. The secondary certificate qualifies the candidate to teach in junior and senior high schools (grades 7-12).

Teaching majors and minors are provided in all areas in which there are classes taught in the secondary schools of the state. It is ordinarily recommended that the majors and minors be selected from related areas. In lieu of majors and minors it is also possible to select composite majors in closely related areas. A complete listing of the requirements for each of the teaching areas can be found in the publication, "Teaching Majors and Minors for Secondary School Teachers," available in the Department of Secondary Education.

A listing of general classifications in which teaching majors and minors appear includes the following; Agriculture, Business, Fine Arts, Homemaking, Industrial and Technical Education, Language Arts, Physical and Health Education, Science, and Social Science.

To obtain the Bachelor of Science degree in secondary education and qualify for the Utah Teacher's Certificate for secondary schools the student must meet the following minimum requirements:

Lower Division

	Credits
Natural Science:	
Biological Sciences	10
Exact Sciences	10
Humanities	10
Social Sciences	10
Psychology 101	5
Freshman English	9
Physical Education	3

Teaching Major and Minor. An approved teaching major of not fewer than 36 credits, of which 15 must be upper division, and an approved teaching minor of not fewer than 24 credits must be completed. A composite teaching major consisting of not fewer than 60 credits in two or more related subjects may be selected. Courses required or recommended for majors, minors, and composite majors are agreed upon by the various subject departments, the Department of Education, and the Council on Teacher Education. For a list of approved programs consult the handbook on "Approved Teaching Majors and Minors in Secondary Education." Students completing a teaching major and minor may graduate in either the department offering that major or the College of Education. Individuals completing a composite major usually graduate from the Department of Secondary Education.

Admission to Teacher Education. Regardless of the depart-

ment in which the student majors, he must apply and be granted permission to enter the teacher education program by the admissions committee of the College of Education two quarters prior to enrolling in **any** Education course. It is advisable for the student to make the "application for admission to teacher education" during the Sophomore year. An overall grade point average of 2.25 or above is required for admission.

A student must apply for student teaching two quarters prior to the quarter of off-campus teaching. The maintenance of a total grade point average of 2.25 or above is required for entrance to student teaching and for certification. The student should be financially prepared to stay off campus during the quarter he has selected as his professional quarter of student teaching.

Professional Courses in Education. For a Utah Teacher's Certificate for secondary schools, students must complete 33 required credits, and if majoring in Secondary Education, an additional three credits. The professional courses are to be taken in the various divisions as follows:

Courses	Credits
A) Understanding the Pupil. (minimum nine credits)	
Public Health 455	3 or 4
Psychology 110	3
Psychology 366	3
B) Understanding the School. (minimum of six credits)	
Secondary Education 301	5
C) Student Teaching. Methods and curriculum (minimum 15 credits)—professional quarter.	
Secondary Education 450	3
Secondary Education 460	12
D) Special Methods. (minimum three credits) Students are required to take the Special Methods course in a teaching major if it is offered. The Special Methods course in the minor field is suggested.	

Each candidate for secondary school teaching is to select the one quarter which best fits his sequence of classes during which time he will spend all day in teacher-training in absentia of campus classes. An additional application must be made for student teaching and credentials are re-evaluated at that time. Secondary Education 450 and 460 are to be taken concurrently and will yield 15 credits during this professional quarter.

Dual Certification. To qualify for a Secondary Certificate, in addition to meeting requirements for the Elementary Certificate, candidates must: 1) complete the requirements for a composite teaching major or for a teaching major and minor as indicated above, and 2) complete 15 credits in Secondary Education including a Special Methods course in either the Teaching major or minor, and student teaching at the secondary school level.

A student desiring to obtain both the Elementary and the Secondary Certificates should consult with an adviser in the Secondary Education Department early in his program. Curricula are also designed for dual certification in Secondary and Special Education.

Homemaking, Industrial and Agricultural Education. Students desiring to major in Homemaking Education, Industrial Education, or Agricultural Education should consult the professional Education requirements listed under these departments.

Graduate Study

The Department of Secondary Education as an integral part of the College of Education assists in the preparation of graduate students seeking the MEd, MA,

and MS degrees, and the EdD degree. The Secondary Education Department offers the MEd, MA, and MS in teaching, and the EdD in Curriculum Development and Supervision. Students desiring information concerning the various graduate programs should write to or consult with the department head and write to the dean, School of Graduate Studies, for a Graduate Catalog which contains the details on the various graduate programs and making application for admission to a graduate program.

Secondary Education Courses

Undergraduate

150. (new) Training Teacher Aides. Experiences to provide insight into a variety of roles which public school classroom teachers perform and to demonstrate functions which an aide might perform to augment teacher performance in the classroom. (2F, W, Sp) **Farrer**

301. (101) Foundation Studies in Teaching. Examination and evaluation of the human requisites for teaching in secondary schools. Through discussion, enactment of teaching episodes, tutorial or school group participation, students will experience several functions of the teaching act. (5F, W, Sp, Su) **Staff**

310. (134) Teaching Social Studies. A methods course for secondary school teachers with teaching majors or minors in any of the social sciences. Prerequisite: Admission to Teacher Education. (5F, W, Sp, Su) **Knight**

320. (135) Teaching English. Considers the content of the English curriculum, effective methods, and significant trends. Prerequisite: Admission to Teacher Education. (5F, W, Sp, Su) **Strong**

330. (145) Teaching Science. Aims and objectives of science education in the secondary schools and the development of curriculum materials to achieve these aims. Class members develop teaching units in science taught in the secondary school. Prerequisite: Admission to Teacher Education. (5F, W, Sp, Su) **Saunders**

335. (146) Laboratory Practicum for Secondary Science Teachers. Discussion and laboratory experience provides initiation into investigative laboratory techniques and procedures appropriate for the new secondary school science curricula. Prerequisite: Admission to Teacher Education. (3F, W, Sp) **Saunders**

340. (new) Teaching Modern Languages. A methods course for secondary school teachers with teaching majors or minors in any of the modern languages. Considers the content, effective methods, and significant trends in teaching modern languages. (5F, W, Sp) **Smith**

450. (127) Secondary Curriculum Seminar. Focus is placed upon the problems arising during student teaching. Includes discussion of teaching plans, procedures, adaptive classroom practices to individual differences, testing, and evaluation. To be taken concurrently with Secondary Education 460. Prerequisite: Admission to Teacher Education. (3F, W, Sp, Su) **Staff**

460. (129) Student Teaching in Secondary Schools. Candidates are assigned to a cooperating teacher in the public secondary schools for student teaching in their major and/or minor subjects. Students will have guided experiences in all professional responsibilities associated with secondary school teaching. Prerequisites: Admission to Teacher Education, Psychology 110, 366, Secondary Education 301, and Special Methods in major and/or minor subjects. (12F, W, Sp) **Staff**

465. (130) Modified Student Teaching. Candidates are assigned to a cooperating teacher in a public secondary school during summer school. The experience is on a modified time basis for only those students who are seeking dual certification in elementary and in secondary education for which state certification requirements are altered. Prerequisite: See Director of Student Teaching. (6Su) **Drake**

507. (232) Aerospace Education. See Industrial Education 507. (3Su) **Staff**

590. (144) Projects in Teacher Education. Examination of innovative practices in the field with encouragement from corps of public school cooperating teachers. Recommended for all graduate students in teacher education and Senior students who have completed graduation requirements. (3Sp, Su) **Staff**

Graduate

602. (131) Student Teaching in Higher Education. Enrollment by permission only. Especially adapted to instructional assignments of graduate assistants, laboratory instructors, or other graduate students who might be specifically preparing for college teaching. (4W, Sp) **Carlisle, Drake**

604. (164) Measurement and Evaluation in Education. Evaluation of procedures in education including principles of measurements,

objectives of tests, and experience in test construction. Development of subjective and objective teacher-made tests. (3F, W, Sp, Su) **Allen**

606. (245) Teacher Training in Adult Basic Education. Open to any graduate student throughout the University whose interests are in the teaching of adults. Emphasizes teaching methods, study of adult interests, and indices of needs of adults in preparation for the world of work. (3F) **Tew**

608. (151) Teaching in Extension Services. Open to all graduate students and university-wide staff interested in improving human relations and teaching efficiency in extension services. (3Sp) **Tew**

610. (147) Improvement of Reading. Study of research in classroom practices and use of materials as designed to assist secondary school pupils to improve their reading abilities For English teachers and those wishing to qualify for secondary remedial reading credentials. Prerequisite: Admission to Teacher Education. (3W, Su) **Strong**

615. (230) Foundations of Curriculum Development. Examination of theories and principles underlying curriculum development with emphasis upon program planning as practiced in conventional and pilot experimental schools. (3F, Sp, Su) **Farrer, Staff**

620. (233) Middle School — Junior High Curriculum. A study of the new developments in curriculum design for schools incorporating the conventional fifth, sixth, seventh and eighth years of the American public school system: its functions, organization, and curriculum. (3Su) **Farrer, Staff**

625. (237) Current Problems in Secondary Education. For graduate students in secondary education and those preparing for school administration or supervision in secondary schools. Reviews current practices in areas of interest to class members. (3W, Sp, Su) **Allen, Farrer**

630. (240) English Curriculum and Instruction. An advanced course for experienced teachers. Evaluation of significant changes in content and methods as revealed by research and successful practice. (3F, W, Su) **Strong**

632. (235) Workshop in English Curriculum. Intensive full-day workshop usually scheduled at conclusion of public school year designed to investigate significant changes in content and methods for teaching the language arts-English curriculum. (3Su) **Strong**

635. (241) Social Studies Curriculum and Instruction. For experienced teachers. Examination and critiquing of newer concepts in curriculum and methods of instruction in social studies. (3F, Sp, Su) **Knight**

637. (256) Development of Social Studies Curriculum. Study of recurring philosophical problems in social studies education, their relationship to curriculum choices in democracy program planning, and problems of content selection and methodology relating to stated objectives. Prerequisite: Sec Ed 310. (3F, W, Sp) **Knight**

640. (242) Science Curriculum and Instruction. For experienced teachers. Study of newer concepts in curriculum and methods of instruction in physical and biological sciences in the secondary school. (3Sp, Su) **Saunders**

645. (243) Mathematics Curriculum and Instruction. For experienced teachers. Examination of newer concepts in curriculum and methods of instruction in mathematics in the secondary school. (3W, Su) **Allen**

650. (244) Speech Curriculum and Instruction. For experienced teachers. Examination of recent concepts in curriculum development in speech education. (3F, Su) **Black**

655. (257) Practicum in Evaluation of Instruction. Designed as the first quarter of a two-quarter sequence in in-service training for experienced teachers and administrators. Emphasis given to improving an educational program in a specific school or school district. (3F, W, Sp) **Staff**

656. (258) Practicum in Improvement of Instruction. Designed as the second quarter of a two-quarter sequence in in-service training for experienced teachers and administrators. Emphasis given to improving an educational program in a specific school or school district. (3F, W, Sp) **Staff**

660. (new) Modern Language Curriculum and Instruction. For experienced teachers. Considers current concepts in curriculum and methods of instruction in modern language education in secondary schools. (3F, W, Sp) **Smith**

693. (283) Readings and Conferences (master's level). Provides for individually directed study in subjects of special preparation with committee chairman. Credit arranged. (F, W, Sp, Su) **Staff**

697. (285) Research and Thesis Writing. Individual work in thesis writing with guidance and criticism from committee chairman. Credit arranged. (F, W, Sp, Su) **Staff**

698. (new) Research Consultation. Continuing advisement beyond the first quarter of thesis writing when committee chairman's efforts are required for analysis of research design and editorial skill. Credit arranged. (F, W, Sp, Su) **Staff**

699. (400) Continuing Registration. Enrollment required of master's candidates not enrolled for other course work or conference

activity but who desire availability of human resources and library facilities. Credit arranged. (F, W, Sp, Su) **Staff**

710. (264) Supervision in Public Schools. Principles and practices of school supervision, including qualifications and responsibilities of supervisors of instruction in public education The roles of the principal, the curriculum director and other personnel in instructional leadership will be considered. (3W, Su) **Carlisle, Farrer**

712. (259) Student Teaching Supervision. Considers ways and means of providing desirable experiences for student teachers in the public schools. The roles of the cooperating teacher and the college supervisor will be analyzed. (3F, Su) **Drake**

714. (259A) Workshop in Supervision of Student Teachers. Intensive program scheduled for a two-week period at conclusion of public school year to accomplish objectives of Sec. Ed. 712. (2Su) **Drake**

715. (366) Internship in School Supervision. Provides extensive experience for the advanced student working towards the Doctor of Education degree in Curriculum Development and Supervision. Supervision is for a minimum of one quarter of full-time activity under the direction of an administrator in a public school or university. Doctoral students only. Credit arranged. (F, W, Sp) **Drake**

720. (364) Theories of Teaching in Public Schools. Analysis of various teaching theories and related methodologies used in classrooms. For doctoral students only. (3W, Su) **Farrer, Staff**

730. (365) Curriculum Development in Public Schools. Advanced principles and practices in curriculum building. Philosophical and sociological bases of the curriculum, youth interest, institutional pressures will be examined. Doctoral students only. (3F, Sp, Su) **Farrer, Staff**

735. (237) Internship in Curriculum Development. For graduate students in secondary education and those preparing for school administration or supervision in secondary schools. Directed activity with selected public school personnel. (3W, Sp, Su) **Allen, Carlisle, Farrer**

793. (new) Readings and Conferences (doctor's level). Provides opportunity under direction of committee chairman for individually directed study in special area of research interest. Credit arranged. (F, W, Sp, Su) **Staff**

797. (385) Field Studies and Thesis. Individual work on research problems in the EdD program. Credit arranged. (F, W, Sp, Su) **Staff**

798. (new) Research Consultation. Continued advisement for candidates for the doctor's degree in curriculum development and supervision who require further assistance from committee chairman on research design, writing techniques, and analysis of data. Credit arranged. (F, W, Sp, Su) **Staff**

799. (400) Continuing Registration. Enrollment required of doctoral candidates not enrolled for other course work or conference activity but who desire availability of human resources and use of library and electronic facilities. Credit arranged. (F, W, Sp, Su) **Staff**

*Department of

Sociology, Social Work and Anthropology

Head: Professor Therel R. Black
Office in Main 220

Professors Wade H. Andrews, Stephen L. Brower, H. Bruce Bylund, William A. DeHart, Gordon N. Keller, Wesley T. Maughan, R. Welling Roskelley

Associate Professor Yun Kim

Assistant Professors Stan L. Albrecht, C. Glenn Conover, William M. Conover, Richley H. Crapo, Nile D. Meservy, Thomas J. Morrione, Alice C. Smith

Instructor Ronald A. Farrell

Lecturer Glen O. Jenson

Degrees: Bachelor of Science (BS), Bachelor of Arts (BA), Master of Science (BS), Master of Arts (MA), Doctor of Philosophy (PhD)

Majors: Sociology, Social Work

The study of Sociology, Social Work, and Anthropology contributes to students in two important ways. First, it provides a broad and general perspective about man. This perspective is developed through examination of the general features of his cultural and social life in complex civilization, and in prehistoric, primitive, and less technologically developed societies. This approach leads to better understanding of the processes and principles of social life that are alike and that are different from one part of mankind to another. This helps the student see himself, his groups, his society and other societies in a meaningful relationship to each other.

Secondly, study in these fields prepares the student for varied occupations in teaching, social welfare, administration, and research.

Teaching positions are largely at the junior high and high school levels and, with more advanced training, on the college level. Teaching positions in the public schools are usually integrated with history; thus, a strong minor in History is encouraged for those who seek teaching positions.

Social welfare positions, both public and private, are widely available. These positions are variously referred to as case worker, group worker, probation and parole officer, child welfare worker, psychiatric case aide, employment officer, etc. Those whose training is in social work, or in sociology with a social welfare emphasis, have significant opportunities here.

Administration, particularly when associated with fields where management of people is crucial, has many and varied openings for persons with training in sociology, social work and anthropology. The human and organizational as-

*In College of Humanities, Arts and Social Sciences.

pect of administration is extremely vital, and persons trained in subjects that provide knowledge and understanding in these areas are in demand.

Research is another occupational outlet. Opportunities to do research exist in industry, government, private and public agencies, and in educational organizations. These positions usually require some graduate training. Because of the need for qualified research people in sociology and anthropology, graduate schools offer scholarships, assistantships, and fellowships to attract students with training in these fields.

Sociology

The sociologist finds employment in a wide variety of fields including social welfare, administration, personnel, public relations, and teaching. Because sociology is taught in the secondary schools in Utah, it is defined as an approved teaching major as long as a teaching minor is obtained in a subject which is required to be taught. Similarly, Sociology is an approved minor when accompanied by a major in a subject which is required to be taught.

Sociology majors must meet the following course requirements:

1) Complete the general requirements of the University (a suggested schedule of courses to meet these requirements is available from the department's secretary or from the student's adviser).

2) Complete a minimum of 48 credits within the department. A maximum of 60 credits within the department is allowed. This is inclusive of any department course used in filling University group requirements. Sociology majors must maintain a g.p.a. of 2.5 in courses within the department.

3) Complete 18 credits in a minor field outside of the department.

4) Complete the following specific courses: Soc 101 or 240; Soc 160 or 460; Soc 301; Soc 320; Soc 330; Soc 350 or Anthr 560; Soc 410; Soc 537; SW 105 or 305; SW 327; Anthr 150 or 502. (SW 105 or 305 must be taken prior to or concurrently with SW 327.)

5) Choose a minimum of nine credits from at least two of the following areas:

a) Modern Problems Area: Soc 340; Soc 420; Soc 440; Soc 441; Soc 550; SW 365.

b) Group Process Area: Soc 130; Soc 552.

c) Institutional Area: Soc 532; Soc 534; Soc 536; Anthr 504.

6) Students expecting to do graduate work should take introductory statistics.

7) Soc 101 or Anthr 101 is prerequisite to upper division courses in the department.

Sociology majors who will seek positions with social welfare and correctional agencies should include a reasonable number of social welfare related courses. Similarly, with the help of advisers, students who will seek positions in other special areas should include appropriately related courses.

Social Welfare Emphasis

Any departmental major desiring a letter of certification in undergraduate Social Welfare must have completed requirements for graduation with the following courses are recommended: Soc 101 SW 327, 415, 416, 427 and 535.

Minor

Students minoring in Sociology must meet the University minimum of 18 credits. The following courses are recommended: Soc 100 or 160; Soc 240; Soc 350 or 301; plus additional elective courses in Sociology to reach or exceed the 18 credits required.

Graduate Study

The department offers courses leading to the Master of Science, Master of Arts, and Doctor of Philosophy degrees in Sociology. Capable students are encouraged to do graduate study. Many good opportunities await those who get such training. Seniors are strongly advised to take the Graduate Record Examination in anticipation of graduate study and other special opportunities.

Graduate instruction in Sociology is comprehensive in its coverage of the general areas of sociological theory, methodolgy, social organization, social deviance and disorganization, social psychology, demography, human ecology, and cultural anthropology. Special concentrations are in areas of staff and departmental research programs. Research is promoted through departmental relationships with the Agricultural Experiment Station, the Division of University Research, the Institute of Social Science Research in Natural Resources, the Population Research Laboratory, state and federal agencies, and with private organizations.

Doctor of Philosophy Degree. This degree is offered in Sociology through collaboration with closely related departments.

Requirements for the PhD degree are explained in the Graduate School section of this bulletin. Also see the Graduate Catalog. Further details are in a department bulletin for graduate students, available upon request from the department secretary.

Graduate assistantships are available. Applications can be obtained in the Graduate School or in the department.

Sociology Courses

Undergraduate

Note: Sociology 101 or Anthropology 101, or instructor's permission if you are a graduate student, is prerequisite to all courses numbered 300 or above.

101. (70) Introductory Sociology. How does biological man become human? The way men of different cultures control their societies and evaluate their behavior. How and why men organize as they do to express their love, hate, and fears or acquire money, education, or security. (5F, W, Sp)
Albrecht, Morrione, Smith

102. (5) American Culture. Basic beliefs, values, customs, and institutions of America. Problems of cultural lag. New knowledge, based upon a changing culture that should redirect institutional life to meet the changing needs of the people. (3) **Maughan**

130. (141) Community Organization and Leadership. Forces within and outside the community that are affecting decision making at the local level. Techniques of training leaders to help make the community more effective. (3F, W) **Maughan**

160. (10) Rural Sociology. The influence of geography upon rural culture. Patterns of settlement and their influence upon rural life. Population growth and migratory patterns of rural people. Conflict, cooperation and other interaction processes. Rural institutions and adjustments to meet rural problems. (5F, W, Sp) **Roskelley, Staff**

240. (80) Modern Social Problems. Major American social problems. Adjustments and changes as a means of minimizing disorganization. (3W, Sp) **Farrell**

300. (153) History of Social Thought. Development of social thought from early periods to Auguste Comte. Important developments in Europe and America after Comte, especially early American thought. (5F)
Roskelley, Staff

301. (170) Intermediate Sociology. Basic principles of sociology are considered in their theoretical and methodological settings, as a

body of facts, a method of investigation and an explanation of associative living. (5F, W) **Bylund, DeHart**

310. (new) Social Statistics. Levels of measurement: measure of central tendency, dispersion, and association; probability, the normal curve, statistical inference. (3) **Albrecht, Kim**

320. (154) Population Problems. Population theory, growth, and changing pattern of the population, and socio-economic and other factors related to population change. The significance of these population changes on today's living. (3F, W) **Kim**

330. (184) Social Change. A systematic analysis of selected theories of social change with emphasis on the social psychological approach leading to an understanding of the change process and alternative strategies for effecting change. (3F) **Bylund**

340. (196) Minority Groups. An analysis of the social and cultural characteristics of various minority groups in the U.S. The nature, sources, and areas of conflict. (3F) **Farrell**

350. (140) Social Psychology. Cultural and social determinants of personality growth. Application of such knowledge to the understanding of group process, mass behavior and the human relations problems that characterize our society. (3F, W) **DeHart, Roskelley**

410. (186) Methods of Social Research. Methods and techniques of analyzing and interpreting social data. (3F, W) **Albrect, Kim**

420. (155) World Population Problems. Current and future population problems, particularly in less developed areas of the world. Factors affecting population growth and change. (3W, Sp) **Kim**

440. (174) Criminology. A social analysis of the crime problem in the U.S. Characteristics and causes of crime as well as social and legal reactions. (3W, Sp) **Farrell**

441. (171) Juvenile Delinquency. The nature, extent, causes, and treatment of delinquency. Programs of delinquency prevention are explored. (3F) **Farrell**

442. (110) Utah Social Problems Seminar. (1F, W, Sp) **DeHart**

460. (195) Urban Sociology. The changing nature of social life as it has moved from predominantly rural to urban patterns. Significant events that have led to urbanization. Guidelines that are useful for thinking about the urban world of tomorrow. (3F, Sp) **Kim**

480. (190) Seminar in Sociology. Seminars in various areas of sociology: a) theory, b) methodology, c) demography, d) social organization, e) social deviance, f) social psychology, g) human ecology. Credit arranged. Instructor's permission required. (F, W, Sp) **Staff**

490. (203) Independent Readings in Sociology. Independent readings in various areas of sociology: a) theory, b) methodology, c) demography, d) social organization, e) social deviance, f) social psychology, g) human ecology. Credit arranged. Instructor's permission required. (F, W, Sp) **Staff**

Graduate and Advanced Undergraduate

509. (176) Development of Sociological Theory. Examination and analysis of important works of prominent sociological theorists since Auguste Comte. (3F, Sp) **Morrione**

513. (new) Survey Research. See Political Science 513. (4) **Bylund, Jones**

520. (289) Methods of Population Analysis. Use of rates, ratios, life tables, and related indices in analyzing, estimating, and projecting population in geographic areas. School, welfare, and labor force populations also will be considered. (3F) **Kim**

525. (208) Population Theories and Policies. To review and evaluate various population theories. Survey various population policies practiced by various governments and evaluate and study the effectiveness of various policies. (3Sp) **Kim**

531. (143) Political Sociology. A sociological analysis of political institutions and power structures, political socialization. (3F) **Albrecht**

532. (159) Industrial Sociology. Stresses contribution of sociology to the understanding of industry as a social system. Includes work behavior of individuals and consideration of the impact of technological change on the community and larger society. (3F, Sp) **DeHart**

533. (156) Social Institutions. Similarities and differences in institutions as they emerge, grow and decline. Problems of keeping institutional objectives attuned to the fulfillment of the needs of an evolving social order. (Sp) **DeHart, Roskelley**

534. (100) Educational Sociology. Sociological factors affecting education within the school and in the community and their implications. (3F) **Maughan**

535. (new) Public Social Welfare. (See Social Work 535.) (3Sp) **Meservy**

536. (188) Sociology of Leisure. Theory of leisure, in terms of function and organizational structure in rural and urban America.

Includes outdoor recreation associated with natural resources and social factors affecting lesiure. (3W) **Andrews**

537. (197) Social Stratification. Nature and consequences of the differential distribution of rewards and prestige in our own society and in other societies. Major topics to be studied: theories of social stratification, criteria of stratification, correlates and consequences of stratification (both societal and behavioral), measurement and method in the study of stratification, and comparative social structures. (3Sp) **Morrione**

540. (172) Delinquency Prevention. Modern philosophies about behavioral characteristics of children. Community and organizational programs of delinquency prevention. (3Sp) **Farrell**

541. (198) Criminal Law and Corrections. A sociological analysis of the criminal courts, law enforcement, and prisons. Alternatives to current practices are examined. (3Sp) **Farrell**

550. (158) Human Relations in Industry. Human relations, philosophy and skills applicable to present-day management practices. The contribution of social sciences in building a human relations program in industry. (3F) **DeHart**

551. (146) Social Movements. A study of sociological conditions that give rise to various types of social movements, and the role of social movements in changing society. (3Sp) **Albrecht**

552. (180) Group Dynamics. Group processes from the point of view of improving individual groups. Social action as a group process. (3W) **DeHart**

560. (187) Sociology of Natural Resources. Designed for upper division and graduate students interested in the social organization and social systems associated with natural resources. In addition to a study of principles, it will include a field study of resource problems. (3F) **Andrews**

561. (189) Human Ecology. Social, cultural and natural-spatial factors affecting the distribution and behavior of modern human society. Relationship of social behavior to the physical environment and resources. (3F) **Andrews**

Graduate

600. (202) Advanced Sociological Theory. Critical analysis of current sociological theory about human society. Prerequisites: Soc 301 and 500 or permission of instructor. (5Sp) **Black**

609. (new) Philosophy of the Social Sciences. (See Philosophy 609.) (3) **Crawford, Robson**

610. (286) Advanced Methods of Social Research. Focus will be upon: a) interview schedules and questionnaire development and construction, b) interviewing and questionnaire techniques, c) organizing data for analysis. (3W) **Bylund**

611. (288) Practicum in Social Research. Supervised application of sociological research in field studies. Credit arranged. (F, W, Sp) **Staff**

620. (290) Advanced Methods of Population Analysis. Advanced techniques in demographic research analyses of fertility, mortality, and migration and population projections. (3W) **Kim**

625. (209) Advanced Demography. To provide an opportunity for detailed studies in fertility and family planning, mortality and morbidity, migration and urbanization, the labor force and economic development, and population projections. (3Sp) **Kim**

640. (199) Social Disorganization. An analysis of disequilibrium in social systems from the standpoint of the social processes which bring them about. (3F) **Farrell, Meservy**

641. (225) Social Deviance. Emphasis is on the symbolic interactionist perspective and the application of this approach in the development of theoretical models and research design. (3W) **Farrell**

650. (245) Sociology of Consumer Behavior. An analysis of consumer behavior theories and research techniques with emphasis on the social-psychological approach. (3F) **Bylund**

660. (210) Advanced Rural Sociology. Analysis of major developments in rural social thought; research and application aimed at solution of rural social problems throughout the world. (3) **Andrews, Roskelley**

680. (207) Seminar in Sociology. Seminars in various areas of sociology: a) theory, b) methodology, c) demography, d) social organization, e) social deviance, f) social psychology, g) human ecology. Credit arranged. Instructor's permission required. (F, W, Sp) **Staff**

690. (203) Independent Readings in Sociology. Independent readings in various areas of sociology: a) theory, b) methodology, c) demography, d) social organization, e) social deviance, f) social psychology, g) human ecology. Credit arranged. Instructor's permission required. (F, W, Sp) **Staff**

697. (201) Thesis Research. Credit arranged. See thesis adviser. (F, W, Sp) **Staff**

699. (400) Continuing Registration. See thesis adviser. (3F, W, Sp) **Staff**

750. (new) Theories in Social Psychology. A critical examination of various social-psychological theories. Attention will be given to such areas as cognitive theories, symbolic interactionism, role theory, exchange theory, reference group theory, and field theory in social psychology. (3) **Albrecht**

780. (207) Seminar in Sociology. Seminars in various areas of sociology: a) theory, b) methodology, c) demography, d) social organization, e) social deviance, f) social psychology, g) human ecology. Instructor's permission required. (F, W, Sp) **Staff**

790. (203) Independent Readings in Sociology. Independent readings in various areas of sociology: a) theory, b) methodology, c) demography, d) social organization, e) social deviance, f) social psychology, g) human ecology. Credit arranged. Instructor's permission required. (F, W, Sp) **Staff**

797. (201) Dissertation Research. Credit arranged. See dissertation adviser. (F, W, Sp) **Staff**

799. (400) Continuing Registration. See Dissertation adviser. (3F, W, Sp) **Staff**

Social Work

Recent social trends and developments have shown the need for increased understanding relating to the problems of personal, family, and group adjustments, as well as poverty and inequality of opportunity in education and employment. The complexities of modern living have placed new emphasis on the development of specialized knowledge and skills for resolving personal and social problems.

Goals. The undergraduate social work major sequence is designed to accomplish the following:

1) Prepare students on the baccalaureate level for employment in social welfare programs relating to juvenile and adult rehabilitation, mental health, children's services, poverty, income maintenance, aging and law enforcement, among others.

2) Prepare students for graduate professional social work education.

3) Contribute to the preparation and education of students who may later seek employment outside the human services area but who will find useful benefit from increased understanding of social welfare content.

4) Provide a liberal educational experience that will contribute to the enrichment of daily community living through a meaningful acquaintance with social welfare needs, services, and issues.

The Council on Social Work Education (foremost national authority) and the National Association for Social Workers (recognized professional association) both have gone on record as favoring undergraduate social welfare training programs on the baccalaureate level. This department holds approved constituency membership in the Council on Social Work Education and has been a charter member from the beginning. Charter membership is also held with the newly formed Intermountain Association of Educators for the Social Services.

Social Work Major

Majors must meet the following requirements:

1) General requirements of the University. (A suggested lower division course schedule is available at the departmental offices.)

2) Complete a minimum of 47 credits in Social Work, Sociology, Anthropology, Psychology, Economics, and Political Science. An overall maximum of 60 credits (including group fillers) within the Department of Sociology, Social Work and Anthropology is allowed. Social Work majors must maintain a g.p.a. of 2.5 in courses taken toward the major.

3) Complete 18 credits in a minor field.

4) Complete the following specific courses: Soc 101, SW 305 or

105; SW 327; Soc 240, 350 or Anthr 560; Soc 410; Soc 460 or 160; Anthr 502 or 150.

5) Complete 22 credits as follows: SW 535 or Econ 552; SW 415; SW 416; PS 561; SW 427 (four credits minimum); Psych 110 or FCD 210; Psych 313 or 321.

Minor

Students minoring in Social Work must meet the University minimum of 18 credits. Because of requirement similarities, students majoring in Sociology may not minor in Social Work.

Select from the following courses to complete the minor: SW 205, 335, 365, 435, 455.

Note to both Majors and Minors: Either SW 305 or 105 should be taken prior to or concurrently with SW 327.

Teaching Certification

The student majoring in Social Work who desires a secondary teaching certificate may take the required education courses and complete the classes listed in the Secondary Handbook for a Teaching Major in one of the approved Social Sciences. Any student taking a teaching major must also complete requirements for an approved teaching minor.

By careful planning, a Social Work major preferring to do so can complete requirements for an elementary certificate.

Social Work Courses

Undergraduate

105. (12) Introduction to Social Welfare. Public and voluntary programs which provide social services. Students who take SW 105 should not take SW 305 as either one is prerequisite to the same courses. (3F, W) **Staff**

205. (60) Social Welfare Philosophy. Social welfare philosophy in a changing social structure. Attention given to society's concern for persons and groups with special needs. (3W) **Staff**

240. (167) Social Welfare Among Minority Groups. Considers use of social work concepts in making maximum use of social welfare resources to ward finding feasible solutions to racial and other minority group problems. (3W) **Meservy**

305. (100) The Field of Social Work. Survey and development of social work as a helping profession. Should be taken during Junior year by departmental majors. SW 105 may be substituted for this class to complete major requirements. Either SW 105 or 305 is prerequisite to and must be taken prior to or concurrently with SW 327. (3F, Sp) **Meservy**

327. (101) Beginning Fieldwork. Seminars, field trips and service projects to acquaint students with social welfare programs on a direct, introductory level. Taken concurrently with or immediately following SW 105 or SW 305. (2F, Sp) **Staff**

335. (120) Child Welfare. Evolution and current developments in programs for meeting needs of children: substitute parental care and adoptions, child labor laws, juvenile courts, provisions for unmarried parents, the handicapped child and the exceptional child. (3F, W) **Meservy**

365. (110) Mental Health. Services offered for the prevention and treatment of mental illnesses and the feasibility of social action programs toward the maintenance of mental health in modern society. This course or its equivalent should be taken by all Social Work majors. (3F) **Meservy**

415. (150) Social Work Skills I. Basic concepts, principles and applications of social work skills as they relate to applied social work methods. Prerequisite: SW 105 or 305. SW 415 and 416 form a continuum for Social Work majors and others who have taken the background courses. (3F, W) **Staff**

416. (152) Social Works Skills II. Application of generic, interventive processes and skills as they relate to working with various personal and social problems. Prerequisite: SW 415. (3W, Sp) **Staff**

427. (155) Intermediate Fieldwork. An educationally directed social welfare field experience. Combines seminar with field assignment. Recommended for Senior year. Prerequisite: SW 105 or 305 and to be taken concurrently with or soon following SW 416. Class may be repeated. Credit arranged but normally student would register for four credits. (F, W, Sp) **Staff**

435. (197) Service of the Aged. Discussion of the effect of the aging process on social

adjustment and of trends toward the development of services and programs for the aged. (3W) **Meservy**

436. (192) Legal Obligations Within the Family. Obligation in husband-wife and parent-child relations according to social law and tradition. Discusses marriage, separation, child custody and the responsibility of parents toward children. (2Sp) **Meservy**

455. (177) Treatment of Children with Problems. Social work treatment of problems of children with special needs. Use of community resources is stressed. (3Sp) **Staff**

Advanced Undergraduate

535. (140) Public Social Welfare. Examination and evaluation of various social welfare institutions with emphasis on public social welfare. Modern institutions and programs attacking poverty and inequality of opportunity. Required for Social Work majors. (3Sp) **Meservy**

585. (195) Social Work Seminar. Review and discussion of social work issues, as covered in news media, publications, and the various source materials as they relate to trends and developments in the field. (1F, W, Sp) **Meservy, Staff**

595. (203) Directed Readings in Social Work. Credit arranged. Instructor's permission and a plan for study required. (F, W, Sp) **Staff**

Anthropology

Anthropology offers the widest possible framework for the understanding of man and society through courses dealing with the present diversity of cultural and human types as well as prehistoric evolutionary perspectives. The study of anthropology provides a useful background for students in the Social Sciences, Humanities, Biological Sciences, and Education. It leads, when pursued through graduate levels, to careers in research, teaching, and some branches of government service.

Minor

Students outside of the department may minor in Anthropology. The University minimum of 18 credits is required. The additional courses should be selected by the student with assistance and approval of his adviser.

Anthropology Courses

Undergraduate

101. (90) Introduction to Anthropology. An orientation to the basic areas of anthropology which includes primate antecedents of man, evolution of man, evolution of human cultural and social life, and analysis of the nature and variability of human kinship, economic, political and religious institutions. (5F, W, Sp) **Crapo, Keller**

150. (92) Peoples and Cultures of the World. Intensive comparisons of the economic, political, kinship and religious structures of representative societies from the major culture areas of the world. (3F, Sp) **Crapo, Keller**

210. (161) Anthropology of Race. A scientific approach to the phenomenon of human physical variability, based on contemporary viewpoints from biology, anthropology, and psychology. (2Sp) **Staff**

230. (95) Human Prehistory. Survey of the evolution of man and culture in the Old World and the New World. (3F) **Crapo**

351. (new) Traditional Africa. Geography, ethnology, and early history of Africa to the coming of the colonial powers. (See History 351.) (3F) **Lye**

410. (170) Introduction to Physical Anthropology. Method and theory in the study of the evolution of man, contemporary human variations, and the processes and factors in human evolution. (3W) **Crapo**

430. (167) North American Prehistory. Man and cultural evolution in the major culture areas of North America. Local field trips and excavation. (3Sp) **Staff**

431. (164) Prehistory of Mesoamerica. An analysis of prehistoric cultural development in Mexico and Guatamala from the time of early hunters and gatherers through the Spanish conquest of the Aztec empire. (3Sp) **Crapo**

432. (169) Archeological Methods and Field Work. The methods of archeological field work and laboratory analysis. Emphasis is on techniques of surveying, mapping, excavation, cultural analysis, and report preparation. Course includes lectures, laboratory work, and field experience. Credit arranged. **(Sp, Su) Staff**

440. (171) Language and Culture. Intensive analysis of the nature and development of

communication and language as aspects of personality, society, and culture. (3Sp) **Crapo**

450. (166) American Indian Ethnology. Economic, political, kinship, and religious structures of representative aboriginal cultures of the main culture areas of the North American Indian. Emphasis will be given to prehistoric peoples of the local great Basin area. (3W, Sp) **Crapo, Keller**

451. (163) Peoples of Mesoamerica. An ethnological survey of cultures in Mexico, Guatemala, and other Mesoamerican countries in various degrees of cultural progress and acculturation. (3W) **Crapo**

Advanced Undergraduate

500. (new) Anthropological Theory. Historical and contemporary anthropological theories of culture, society, and personality. (3F) **Crapo**

501. (105) Comparative Value Systems. Comparative and theoretical study of the nature and variability of values, value systems, and cultural orientations. Relationships of these cultural phenomena to personality. (3W, Sp) **Keller**

502. (160) Comparative Family Systems. Basic anthropological concepts and theories relating social structures based on kinship, its analysis, evolution, function, change and variability over the world. (3F) **Keller**

504. (162) Anthropology and Religion. Theoretical analysis of religion as a cultural phenomenon. The functional relationships of religion to culture, society, and the individual. (3W) **Keller**

540. (new) Introduction to Linguistics. Theory of language and survey of structural and generative phonology, morphology, syntax; language acquisition; second language learning. (See Language 540.) (5W) **Lackstrom**

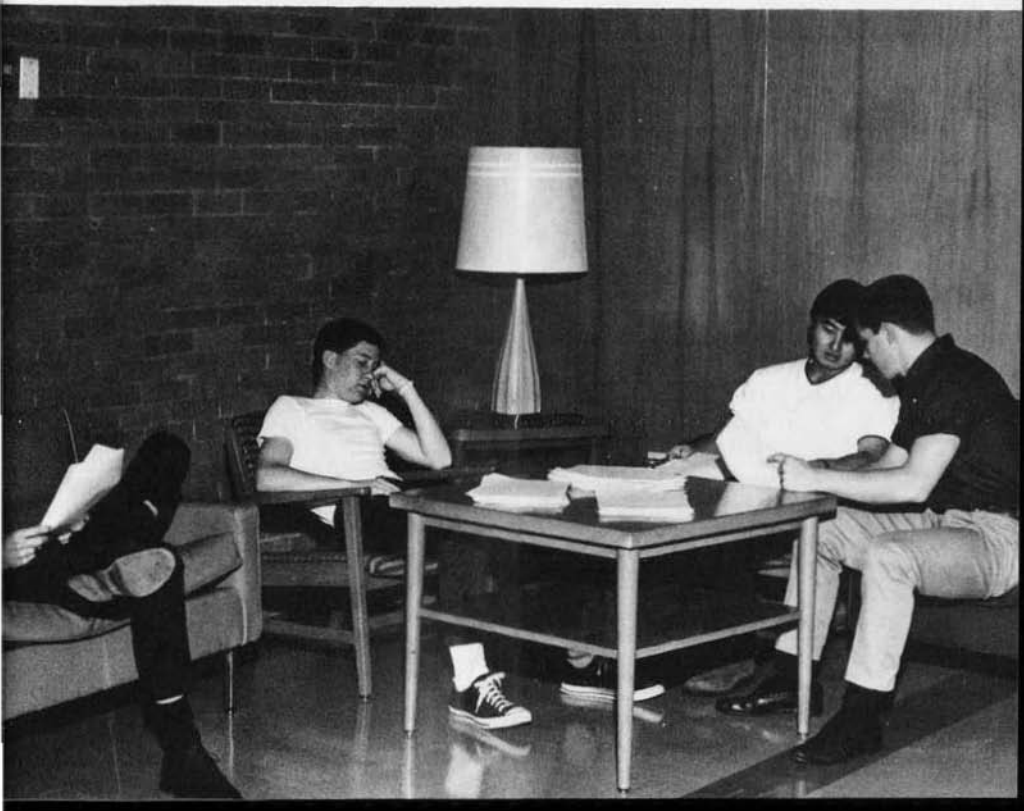
560. (165) Culture and Personality. Cultural and social factors in the development and structure of personality from a cross-cultural perspective. (3F, Sp) **Keller, Roskelley**

561. (269) Psychological Anthropology. A comparative analysis of psychiatric disorders and behavior disturbances with social categories in western society and various societies of the world. (3Sp) **Keller**

590. (168) Independent Studies. Credit arranged. (F, W, Sp) **Staff**

Graduate

690. (268) Independent Studies. Credit arranged. (F, W, Sp) **Staff**



*Department of

Soil Science and Biometeorology

Head: Professor R. L. Smith
Office in Agricultural Science 148

Professors David W. Carter,[1] John W. Cary,[1] Paul D. Christensen, Inge Dirmhirn, R. John Hanks, Jerome J. Jurinak, Glen E. Leggett,[1] Raymond W. Miller,[2] George W. Reynolds, Jay H. Smith, D. Wynne Thorne

Associate Professors Gaylen L. Ashcroft, Charles F. Chappell, David W. James, Henry F. Mayland,[1] Rex F. Nielson, E. Arlo Richardson,[2] John J. Skujins, Alvin R. Southard, Gene L. Woolridge, James L. Wright[1]

Associate Professor Emeritus LeMoyne Wilson

Research Associate Reuel Lamborn

Research Assistants Charles L. Craw, Robert Griffen, C. Don Kidman

Degrees: Bachelor of Science (BS), Master of Science (MS), Doctor of Philosophy (PhD)

Majors: General Soils, Industrial Soils and Agricultural Chemistry, Soils and Irrigation, Soil Science, Biometeorology and Climatology

The Soils and Biometeorology research laboratories at USU are widely recognized for research in soil chemistry, soil classification, soil and plant nutrition, soil physics, soil salinity, soil testing, and micrometeorology. Much of the latest equipment and facilities are available for studying the composition of soil and plant materials, the retention and movement of water and other materials through soils and plants, evapotranspiration, the reactions of pesticides in the soil, plant nutrition, the influence of soils and atmospheric environment on plants and animals, fertility requirements, water quality, trace elements and the use and conservation of soil, atmospheric, and water resources.

*In College of Agriculture.
[1]USDA Collaborators.
[2]U.S. Department of Commerce Collaborators.

Advanced undergraduate students are often given the opportunity for employment to work with staff members and graduate students on original research projects. Emphasis is upon problems connected with arid and subhumid soil and climate complexes that are characteristic of the Intermountain and Great Basin region.

Undergraduate Study

Majors must have a grade point of 2.5 or better in all Soils and Biometeorology courses. Any Soils or Biometeorology courses passed with a "D" grade must be repeated. Transfer students are required take at least 15 credits of the major in residence at USU.

Core Curriculum in Soils

All majors in Soils must take the following core curriculum:

FRESHMAN YEAR

Courses	Credits
English 101, 102, 103	9
Chemistry 111, 112, 141 or 121, 122, 123	15
Math 101, 105	10
Meteorology 117	3
Social Sciences or Humanities	10
MS, AS, or PE requirements	3
	50

SOPHOMORE YEAR

Soils 358	5
Biology 120, 121, 122 (any two)	10
Geology 110	5
Social Sciences or Humanities	15
	35

JUNIOR YEAR

Soils 555, 556	4
English 303, 305	3
	7

SENIOR YEAR

Soils 480, 514	6

General Soils Curriculum

A major in General Soils prepares the student for positions as an agronomist in the agricultural extension service, a farm planner, a field man, a farm manager with commercial companies, or a conservationist in the U.S. Civil Service.

The following courses are required in addition to the core curriculum. It is suggested that the Chemistry in the Freshman year be exchanged with Biology 121, 122 in the Sophomore year.

Courses	Credits
Agricultural and Irrigation Engineering 310 or 343	3
Soils 470	3
Landscape Architecture 103 (Social Science)	3
Animal Science 101, 240	3-5
Ag Economics 201, 202, 220	9
Botany 440	5
Biological Science courses	28
Electives (for minimum of 186 credits)	36

Required biological science courses are Plant Science 440 or 450, 432, 330, 331, 570, 460 and 555 or 565; Biology 512; Soils 530. (Select any 28 credits.)

Other suggested electives are Soils 565, 566; Meteorology 225, 551; any Plant Science course; Botany 420, 641, 651; Entomology 539; Range 184, 185; Bacteriology 101 and 102 or 301; Applied Statistics 351 or 431, 432, 433; Chemistry 360; Geology 560 and 556; Business Administration 511 and 550; Accounting 305; Ag Economics 510, 517 and 535; Agricultural and Irrigation Engineering 308; and Art 340 or 140.

Business Curriculum in Soils

The Industrial Soils and Agricultural Chemistry option will equip the graduate to handle jobs with commercial companies as managers, general fieldmen, salesmen and technicians and for various civil service and state positions. The training will prepare the graduate for employment in industries concerned with the manufacture and distribution of fertilizers, herbicides, fungicides, insecticides, and various agricultural products.

In addition to the core curriculum, the student must take the following courses:

Courses	Credits
Economics 200 (Social Science)	5
Landscape Architecture 103 (Social Science)	3
Ag Economics 201, 202, 220 (Social Science)	9
Accounting 305	4
Entomology 539	5
Botany 440, 651	10
Animal Science 101 or 240	3-5
Business Administration 511, 550	8
Plant Science 565 or Chemistry 360	5
Plant Science 555	4
Soils 530	3
Chemistry 331	4
Agricultural and Irrigation Engineering 310 or 343	3

Some suggested electives are Business Administration 560, 441, 446; Chemistry 116, 360; Ag Economics 510, 517, 535; Plant Science 432, 420, 565; Bacteriology 101, 102 or 301; Art 140; Soils 577; and other courses in Animal Science, Dairy Science, Plant Science, and Veterinary Science.

Soil Science Curriculum

The science curriculum affords choices in either Soil Science or in Soils and Irrigation (administered jointly with the Department of Agricultural and Irrigation Engineering). A student graduating with one of these Soil Science options is well equipped to do either applied or graduate work, and to assist in soil and water research and utilization programs. Students who select the science curriculum and take 23 credits in Soils meet the requirements of the Soil Science Society of America for certification as a soil scientist or conservationist. Students selecting Soil Science are prepared for many kinds of Soil Science positions in connection with industrial research, agriculture, forestry, range science, engineering and education.

A student selecting the Soils and Irrigation option is trained to manage and operate irrigation systems and installations and to work for extension and conservation organizations as irrigation specialists. The opportunities for foreign service are particularly good for this option. By correct choice of electives the student will be well trained in hydrology and equipped for positions with a number of federal, state, and local governmental and civic organizations in planning and supervising the use of soil and water for a multitude of purposes.

In addition to the core curriculum, the student must take the following courses:

SOILS AND IRRIGATION OPTION

Courses	Credits
Physics 111, 112, 113 or 221, 222, 223	15
Math 106, 220, 221, 222, 223,	25
Soils 470, 565, 566	8
Meteorology 325	3
Civil Engineering 221 or 224	3
Industrial and Technical Education 320, 321	6
Agricultural and Irrigation Engineering 308, 545, 547, 548, 549, 560 (select three)	10
Agricultural and Irrigation Engineering 310 or 343	3
Restricted elective (upper division Math, Chemistry, Physics)	5

It is suggested that electives be filled from the following courses: any upper division Agricultural and Irrigation Engineering course; Soils 530, 577; Botany 440, 641, 651; upper division Plant Science courses; Applied Statistics 431, 432; Geology 560, 556; Meteorology courses; upper division Math, Chemistry, or Physics.

SOIL SCIENCE OPTION

Course	Credits
Physics 111, 112, 113 or 221, 222, 223	15
Math 106, 220, 221, 222, 223	25
Soils 530, 565, 566	8
Meterology 325 or Computer Science 380	3
Chemistry 360, 331	8
Botany 440	5

It is recommended that the electives be filled from the following courses: Soils 577; Agricultural and Irrigation Engineering 308, 545; Botany 420, 440, 641; any upper division Plant Science courses; Range 342, 343, 441; Applied Statistics 342, 343; Geology 400, 500, 560, 556, 502; Meteorology courses; upper division Math, Chemistry, or Physics; Entomology 539.

Master of Science Degree. The department, in cooperation with related departments, offers Master of Science programs in Soil Physics, Soil Chemistry, Soil Fer-

tility, Plant Nutrition, Soil Genesis, Soils and Irrigation, Biometeorology, and Climatology. A Master of Science degree in the department is accepted by most other universities as equivalent to a year's work toward a Doctor of Philosophy degree in the subject pursued.

Doctor of Philosophy Degree. The department, in cooperation with related departments, offers the Doctor of Philosophy degree in Soil Physics, Soil Chemistry, Soil Fertility, Plant Nutrition, Soil Genesis, Soils and Irrigation, Biometeorology, and Climatology. Detailed information may be obtained from the department or from the dean of the School of Graduate Studies.

Acceptance. Student applications submitted to the School of Graduate Studies for advanced study in Soils and Meteorology are reviewed by a departmental committee. The applicant may be accepted without reservation, on probation, as a non-candidate, or rejected.

Students accepted on a probationary basis will not be assigned a research problem, given research credit, be assigned a graduate committee, nor considered for an assistantship until such probation has been removed as a result of academic excellence. This probationary status cannot be indefinite and is limited to two quarters. A probationary student who does not maintain "B" grades or better will not be permitted to continue in the department.

Fellowships and Traineeships. The department has National Defense Education Act (NDEA) fellowships and National Science Foundation (NSF) traineeships that are awarded on the basis of national competition.

Assistantships and Major Professors. Acceptance of a student to pursue graduate study does not grant him an assistantship or the right to study under a particular professor. Assistantships are awarded to accepted students by the professors having funds to cover specific research. Funds are not available to provide all students with assistantships. Some students who wish to do graduate work may be accepted if they do not desire financial assistance. Permission to study under a particular professor may be granted by the professor in question after consultation with the student.

Program Direction. The graduate student's program is directed by a graduate committee consisting of his major professor and at least two other professors. The student and major professor may indicate a choice of committee members, but the final appointment is made by the dean of the School of Graduate Studies.

Soils Courses

Undergraduate

358. (58) Introductory Soils. A brief study of soil formation, classification properties, fertility and management. Suggested prerequisite: Inorganic Chemistry. Four lectures, one lab. (5F, Sp) **Staff**

470. (107) Irrigated Soils. Soil salinity, soil-moisture-plant relationships, water supply and quality, irrigation water measurement, soil moisture movement, irrigation methods. Prerequisite: An introductory course in Soils or instructor's consent. (3Sp) **Staff**

480. (199) Soil Seminar. Required of all Soils Seniors in the department. (1W) **Staff**

490. (103, 104, 198) Special Problems. Conferences or laboratory investigations. Subject and credit arranged. Must be approved by the department. (F, W, Sp, Su) **Staff**

505. (105) Chemistry of Soil-Water Systems. An introductory course of the chemical nature of the soil and the soil solution. Ion exchange, colloidal behavior, ionic equilibrium and transport as related to the problem of pollution of soil and water. Prerequisite: Soils 358. (3F) **Jurinak**

514. (114) Soil Identification and Interpretation. Important soil properties for identification and classification of soils with emphasis on interpretation for use and management. Soil fertility and conservation will be considered. (5Sp) **Southard**

515. (115) Soils of Equatorial Regions. Weathering processes and soil formation in tropical areas with emphasis on soil properties and the interpretation of laboratory data as related to use and management of soil. Visiting lecturers from different areas of interest and experience will participate in the course. (2W) **Southard**

530. (110) Soil Microbiology. Activities and ecology of microorganisms related to soil properties, soil fertility, soil organic matter, and the rhizosphere. Prerequisites: Biology 120, 121; Chemistry 332, 360 or consent of instructor. Two lectures, two labs. (4F) **Skujins**

555. (155) Soil and Plant Nutrition. Plant and soil relations with respect to irrigation water and soil environment: nutrient availability, adsorption, toxicity, fertilizers, plant nutrition and water quality. Prerequisite: Soils 358. (3W) **James**

556. (156) Soil and Plant Nutrition Laboratory. Methods of analysis. Prerequisite: Prior or concurrent registration in Soils 555 or instructor's consent. (1W) **James**

565. (165) Physical Properties of Soils. Physical relationships of soil moisture, temperature, penetrability, and aeration to plant growth. Structural conditions, tillage, irrigation, and other soil management practices are considered as factors that affect these relationships. Prerequisite: Previous soils training. (3F) **Hanks**

566. (166) Physical Properties of Soils Laboratory. Methods of analysis. Prerequisite: Prior to or concurrent with Soils 565 or instructor's consent. (2F) **Hanks**

****577. (177) Chemical Analysis of Soils.** Emphasis will be on the theory of analytical techniques and the operation of instruments necessary for the more usual analyses done in plant and soil research. Two laboratory periods. Prerequisite: Instructor's consent. (2W) **Miller**

Graduate

****614. (214) Soil Physics.** Structure of clay minerals and their relation to absorption and other surface phenomena; soil moisture and air relations; and soil stabilization. Prerequisite: Soils 565. (3Sp) **Hanks**

***615. (215) Physical Chemistry of Soils.** Physio-chemical, colloidal, and surface aspects of soils and related systems. Prerequisite: Chemistry 306. (3W) **Jurinak**

619. (219) Saline and Alkali Soils. (2W) **Smith**

****621. (221) Genesis, Morphology and Mineralogy of Soils.** Prerequisite: Soils 514 or instructor's consent. Three lectures. (3Sp) **Southard**

****624. (224) Soil Chemistry.** Prerequisite: Chemistry 306 or instructor's consent. (3Sp) **James**

630. (210) Soil Biochemistry and Microbiology. Lectures, and discussion on origin and properties of soil organic matter, fate or agriculture chemicals in soil, and microbial activities at soil interfaces and in the rhizosphere. Prerequisite: Soils 530 or instructor's consent. (2W) **Skujins**

680. (299) Seminar. Required of all graduate majors. (1F, W, Sp) **Staff**

690. (298) Special Problems. Soils students review literature on problems and conduct experiments. Credit arranged. Must be approved by department. (F, W, Sp, Su) **Staff**

697. (230) Research and Thesis. Credit arranged. (F, W, Sp, Su) **Staff**

698. (new) Research Consultation. Credit arranged. (F, W, Sp, Su) **Staff**

699. (new) Continuing Registration. Credit arranged. (F, W, Sp, Su) **Staff**

780. (new) Seminar. Credit arranged. (F, W, Sp, Su) **Staff**

790. (new) Special Problems. Credit arranged. (F, W, Sp, Su) **Staff**

797. (new) Dissertation Research. Credit arranged. (F, W, Sp, Su) **Staff**

798. (new) Dissertation Consultation. Credit arranged. (F, W, Sp, Su) **Staff**

799. (new) Continuing Registration. Credit arranged. (F, W, Sp, Su) **Staff**

Biometeorology Courses

Undergraduate

117. (17) Introduction to Weather and Climate. Temperature, wind, clouds, precipitation, storms, air masses, atmospheric circulation, and the impact of weather and climate on human activities. (3F, W, Sp) **Ashcroft**

127. (27) Descriptive Oceanography. Nature and behavior of the oceans and their coastlines. Emphasis will be on relationships between oceanography and other fields. (3W) **Reynolds**

325. (125) Bioclimatology. Interrelations between living organisms, both plants and animals, including man, and the physical and chemical factors of their atmospheric environment. Prerequisite: Met 117. (3W)
Richardson

332. (130) Observations and Instruments. Instruction and some practical experience in the use of standard observational equipment as used by various government agencies and foreign countries. Includes: measurements and observations of meteorological phenomena both surface and upper air; instruments, their potential and limitations; data coding, dissemination and publication, storage and elementary analysis. Prerequisite: Met 117. (3W) **Staff**

***434. (134) Introduction to Synoptic Meteorology.** Treatment of fog, clouds, thunderstorms, tornadoes, lightning, atmospheric electricity, atmospheric acoustics, atmospheric optics, and hurricanes. Prerequisites: Met 117, Physics 223, or instructor's consent. (3Sp) **Staff**

500. Introduction to Aeronomy. A survey of properties and processes in the upper atmosphere: atmospheric structure, magnetospheric phenomena, the ionosphere, solar terrestial relationships, aurora and airglow, and atmospheric reactions. (3S) **Baker**

517. (117) Weather and Climate. To give teachers a basic knowledge of weather phenomena, including causes and effects. Topography and seasonal changes in weather and climate. Development of aids in teaching units on weather and climate. (4Su)
Richardson

530. Introduction to Meteorology. For students with a science background or major. A more qualitative treatment of the nature of storms, winds, clouds, temperature, precipitation, air masses and atmospheric circulation than is given in Met. 517. (4W)
Ashcroft

***594. (141) Tropical Climatology.** Relationships between tropical climates and meteorological patterns, topographical conditions, coastal and continental locations, industry, transportation, vegetation, agriculture, health and wealth. Prerequisite: Met 117. Credit arranged. (Sp) **Staff**

620. (120) Climatology. General cause and effect relationships between physical features of the earth and climates. Prerequisite: Met 117 or instructor's consent. (3Sp) **Staff**

631. (131) Physical Meteorology. Condensation processes in the atmosphere; visibility in meteorology; solar and terrestrial radiation; meteorological acoustics; meteorological optics; atmospheric electricity. Prerequisites: Met. 117, Physics 223, or instructor's consent. (3F)
Staff

632. (132) Dynamic Meteorology. A brief review of fundamental and physical concepts; definitions of selected hydrodynamic and thermodynamic terms; thermodynamics and status of the atmosphere; effects of water vapor on thermodynamic characteristics of the atmosphere; horizontal motions in the atmosphere; characteristics of fluid flow. Prerequisites: Met. 517, Physics 223, or instructor's consent. (3W) **Staff**

633. (133) Synoptic Meteorology. General circulation patterns, vertical structure, development, and life cycle of cyclones and anticyclones. Air masses and fronts and their structure. Interpretation and analysis of meteorological charts and diagrams including thermodynamics charts, cross sections, and surface and upper air maps. Three lectures, two lab recitations. Prerequisites: Met 332, Physics 221, or instructor's consent. (5Sp)
Staff

Graduate

***634. (171) Cloud Physics.** Brief review of thermodynamics of moist air; thermodynamics equilibrium and change; nucleation processes; nuclei in the atmosphere; the initial growth of droplets spectra and growth by coalescence; cloud dynamics; weather modification. Prerequisite: Met 117 (3Sp) **Staff**

****645. Paleoclimatology.** A review of factors influencing climatic change and evidence of climatic variations drawn from many disciplines. Prerequisites: Met 117 or instructor's consent. Credit is arranged. (Sp) **Staff**

652. (160) Biometeorology Instruments. This course is designed to give the student an insight into how to plan and perform biometeorological experiments. Starting from the statement of a number of problems in the environmental sciences, methods will be developed with specific experimental solutions. The course will cover the whole scale of instrumentation that is used in solving questions of heat exchange, the water cycle, and physiological processes. Prerequisite: Met. 332 or instructor's consent. (2W) **Dirmhirn**

****670. (170) Air Pollution Meteorology.** Readings selected to give a broad background of air pollution problems in the United States and the place of meteorologists in their solutions. Prerequisites: Met 117, College Physics and Calculus. (3F) **Staff**

695. (242) Mountain Climatology. Readings in free air climatology as determined from upper air soundings. Modifications of the free air imposed by interaction of principles studies in Physical Climatology and variations in slope, aspect, altitude, and other topographic influence. Credit arranged. (Sp) **Richardson**

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*Taught 1971-72.
**Taught 1972-73.

*741. (241) **Physical Climatology.** Special emphasis will be placed on the global energy and water balance regimes of the earth and its atmosphere. Radiation, heat transfer in soil, water and air, and evapotranspiration. Prerequisites: Met 531, 532. (3W) **Staff**

752 (226) **Instrumentation Lab. Each student will select two problems, one to be executed in the laboratory, the other in the field, to give the student a feeling of how to test and check instruments and how to use and control them under field conditions. Prerequisite: Met 332. (3Sp) **Dirmhirn**

*693. (225) **Environmental Field Experiments.** An introduction to the practical handling of problems in environmental meteorology. Every student will have to solve several problems in the field. Prerequisite: Met 551. (3Sp) **Dirmhirn**

794. (180) **Methods in Applied Climatology.** Readings and problems in the procedures and techniques of selecting, organizing, summarizing, interpreting, and reporting climatic information for specific practical purposes. Concentration will be on the entire problem, beginning with its specific definition and ending with the report to the assumed client. Prerequisites: Met 520. (3F) **Staff**

701, 702, 703. To introduce the first-year graduate student to the elements of the physical processes operating in the Earth's high atmosphere. Topics to be covered will include composition and temperature of the atmosphere, energy balance, atomic and molecular processes and dynamics. Emphasis will be based on the application of knowledge which the student has already acquired to solution of real physical problems. Prerequisite: Solid foundation in the physical sciences. (3F, 3W, 3Sp) **Megill**

704. **Ionospheric Physics.** A discussion of the observational and theoretical aspects of ionospheric physics. Topics to be covered include production and loss mechanisms for the ionization, transport processes, and effects of ionospheric storms. The emphasis will be on the ionosphere above 100 km. (3F) **Peterson**

706. **Circulation of the High Atmosphere.** Dynamics of the stratospheric and mesopheric circulation systems in cartesian and wavenumber space; gravity wave mechanisms above the jet stream level; large-scale circulation patterns of the stratosphere and mesophere; sudden stratospheric warming; stratospheric transport and hemispheric mass exchange; vertical motions and energy transformations in the stratosphere; ozone anomalies and radiation warming. (3Sp) **Wooldridge**

780. (new) **Seminar.** Credit arranged. (F, W, Sp, Su) **Staff**

790. (new) **Special Problems.** Students select a problem, review literature, conduct experiments, and write a report. Credit arranged. Must be approved by department. (F, W, Sp, Su) **Staff**

797. (new) **Dissertation Research.** Credit arranged. (F, W, Sp, Su) **Staff**

798. (new) **Dissertation Consultation.** Credit arranged. (F, W, Sp, Su) **Staff**

799. (new) **Continuing Registation.** Credit arranged. (F, W, Sp, Su) **Staff**

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*Taught 1971-72.

**Taught 1972-73.

*Department of

Special Education

Department Head: Professor Marvin G. Fifield
Office in Richards Hall 514G

Professor Joseph P. Kesler

Associate Professors Frederick S. Berg, Sara L. James, Devoe C. Rickert

Assistant Professors Alan Hofmeister, Dwayne D. Peterson, Phyllis R. Publicover

Instructors Carol R. Beasley, Lionel Brady, James Butler, Julia Collins, Joan Thorkildsen

Lecturers Mary Catlin, Richard Davidson, Colleen White

Degrees: Bachelor of Science (BS), Master of Education (MEd), Master of Science (MS), Doctor of Education (EdD)

Majors: Undergraduate: Mental Retardation; Graduate: Mental Retardation, Clinical Teaching—Learning Disabilities, Cultural Disadvantage, Emotionally Disturbed

The Department of Special Education offers education and training opportunities for teachers, preschool workers, supervisors, researchers, social workers, psychologists, and classroom aides. Courses are open to all students who have the necessary prerequisites.

All courses of study in the department lead to a degree at the graduate level except in the area of Mental Retardation where an undergraduate degree is offered. Special Education is not yet authorized as a minor for those obtaining elementary or secondary certification. Students with majors in other teaching fields are urged to pursue certification in Special Education by taking required courses leading to endorsement within their elective areas. A total of 27 credits of specialized training is required. Details are available through the Special Education Department.

Students attending college under provisions of National Defense Education loans are reminded that if they are public school teachers in special education classrooms after receiving their degree, the loan is cancelled at the rate of 15 percent per year, with complete cancellation after seven years.

Undergraduate Study

Undergraduate study leads to the Bachelor of Science degree in Special Education, with certification to teach the intellectually handicapped.

A) **Lower Division.** Specific lower division requirements are explained on pp. 27-30 of the catalog.

B) **Academic Preparations.** The candidate must complete not fewer than 54 credits in specific fields prescribed by the department as suitable for teachers of the intellectually handicapped. The student is advised to select two areas of 18 credits each which are approved as minors, or one area acceptable as a major (36

*In College of Education.

credits). Course work should be selected with the approval of the student's adviser.

C) **Professional Preparation.** Not fewer than 54 credits are required, including the following:

1) Not fewer than 18 credits selected from the following:

Family and Child Development 150[1] or 210[1]
Psychology 366
Public Health 454[1] or 455[1]
Elementary Education 301[1] or Secondary Education 301[1]
Elementary Education 410[1] or 415[1]

2) Thirty credits of specialized training selected from the following:

Special Education 301,[1] 302,[1] 303[1], 311[1], 512[1], and 513[1]
Physical Education 482
Special Education 304, 381, 501[1], 502[1], 581, 582, 583

3) An additional six credits of electives will be selected with the approval of the adviser.

Emotionally Disturbed Program. This is a graduate program, but undergraduates who wish to prepare for it should consider taking Psychology 340 and Special Education 101, 141, 301, 302, 304, 381, 501, 521, 582.

Graduate Study

A person who has a BS degree and an elementary or secondary certificate can certify to teach the intellectually handicapped by competing 27 credits of specialized training and being recommended by the department upon an evaluation of their undergraduate program.

Master's Degree Programs in Mental Retardation are designed to meet the needs of the individual student and will depend on his background and vocational plans. A total of 48 credits is required for an MEd degree, which is primarily a degree for those who wish to teach the intellectually handicapped.

An MS degree requires 45 credits (including a thesis) and is available to those who are considering research, service work, or who plan to continue for an advanced degree in the field. Selection of a program will vary with the choice of degree and the needs of the individual.

Core courses for both programs include the following:

Special Education 301, 302, 303 (prerequisites)
Educational Administration (MEd) 666
Educational Administration (MS) 667
Psychology 380 (prerequisite for Educational Administration 667)
Special Education 512, 601, 602, 611, 612, 614, 697.

The balance of the program is to be selected on the basis of past training and vocational aims with the prior approval of the student's adviser and his graduate committee.

All graduate degrees are based more upon quality than quantity, and completion of a set number of credits does not guarantee that a degree will be granted.

Master of Education (or Science) in Special Education, with Emphasis on Emotionally Disturbed. A teaching certificate (elementary or secondary) is prerequisite to an MEd degree, and to professional certification as a teacher. The required course of study is:

Courses	Credits
Special Education 301	3
Special Education 302	3
Special Education 303 (prerequisites to graduate study)	3
Special Education 502	3-12
Special Education 501	3-12
Special Education 601	3
Special Education 621	3
Special Education 622 and/or 623	3-6

[1]Required.

Special Education 602 and/or 641	3-6
Special Education 697 (MS)	3-9
Psychology 340 and/or 697 plus	3-5
Educational Administration 666 (MEd)	3
Educational Administration 667 (MS)	3
Special Education 682	3
Special Education 681	3

Approved electives will complete the program.

Master of Education (or Science) in Special Education with Emphasis on Cultural Disadvantage. This course of study is designed to meet the needs of teachers of children and youth whose learning difficulties are attributed to the cultural differences and deprivations which are prevalent among children from socially or economically disadvantaged environments.

Required courses should be taken in the sequence shown. Student teaching may be waived for acceptable experience; but if required, the total program may take four quarters to complete.

Courses	Credits
Special Education 141	3
Special Education 301	3
Special Education 302	3
Special Education 303 (prerequisites)	3
Anthropology 501 or 560	3
Special Education 602	3
Special Education 642	5
Special Education 501	3
Special Education 304	3
Special Education 641	3
Educational Administration 666 (MEd)	3
Educational Administration 667 (MS)	3
Special Education 681	3-9
Electives	13-16

The above program may be modified to meet the needs of those interested in the education of American Indians.

Master of Education (or Science) in Special Education, with Emphasis in Educational Audiology. This degree is administered by the Department of Communicative Disorders. Please refer to that section of the catalog for more information.

Master of Education (or Science) in Special Education, with Emphasis in Learning Disabilities. Either an elementary or secondary teaching certificate and successful teaching experience are prerequisite for an MEd. Required courses are:

Courses	Credits
Special Education 301	3
Special Education 303	3
Psychology 380	3
Elementary Education 415 (prerequisites)	3
Special Education 302	3
Elementary Education 635	3
Elementary Education 636	3
Elementary Education 637	3
Special Education 501	3-12
Special Education 502	3-12
Special Education 603 (Minimum of 12 credits from four previous courses listed)	6-12
Psychology 568	3
Special Education 602	3
Psychology 530 or Special Education 621	3
Special Education 601	3
Psychology 668	3
Educational Administration 666 (MEd)	3
Educational Adminstration 667 (MS)	3-9
Special Education 697	3-9

Approved electives will complete the program.

Doctorate of Special Education (EdD) with Emphasis in Mental Retardation or Emotional Disturbance. This program was authorized by the Utah Board of Higher Education in January, 1970. The program is designed to provide training for researchers and for those persons preparing to teach in college. Because each student receives an individually designed and prescribed set of courses, the total sequence of courses which are mandatory cannot be outlined here. Interinstitutional course coordination is a unique feature of this degree program. For information regarding this program write to the department head.

Required courses for the EdD program include:

Courses	Credits
Special Education 603	3-12
Special Education 681	3
Special Education 781	8-10
Special Education 793	3-15
Special Education 797	18-30

Doctorate of Education in Curriculum and Supervision with Emphasis in Special Education. This is an interdepartmental program providing course work emphasis in several departments within the College of Education and other colleges in the University. This degree is designed for those planning to enter college teaching, coordinating or supervising in school districts, or state school offices. For information regarding this program write to the department head.

Special Education Courses

Undergraduate

101. (1) Orientation to Special Education. Introduces the student to special education provisions in public schools, community centers, institutions, etc., throughout Utah. Special emphasis placed on observing children who have been placed in education facilities. Field trips are arranged during the course. (3F, Su) **Staff**

102. (2) Directed Observation. Supervised observation of exceptional children in various school activities. Will help the student determine his interests, strengths and weaknesses before entering the field of special education. (2F, W, Su) **Staff**

141. (99) Introduction to Compensatory Education. Definition of the problems of the educationally disadvantaged pupil, and discussion of programs which have been tried. (2F, Su) **James**

301. (123) Education of Exceptional Children. Characteristics of all types of exceptional children with emphasis on the educational and psychological implications of these conditions to the development of the child. See Psychology 313. (3F, W, Sp, Su) **Publicover**

302. (186) Diagnosis and Treatment of Learning Difficulties. Emphasis upon developmental and corrective measures in basic educational skills in the typical classroom. (3F, W, Sp, Su) **Hofmeister**

303. (146) Behavior Management in Special Education. Immediate methods and techniques for modifying problem behavior of children. Identification and recording techniques with field experiences. Prerequisite: Psychology 111 or instructor's consent. (3W, Su) **Rickert**

304. (195) Special Education and the Community. People, relationships, communication, control channels and processes outside the teacher-pupil relationship which affect the competency of the special educator. Modes of coping are suggested. (3W) **James**

311. (124) Educational Characteristics of Mental Retardation. Identification of the mentally retarded, their etiology and syndromes, problems of classification, organization, and structure of school programs for the retarded. (3Sp) **Peterson**

340. (127) Psychology of Learning. See Psychology 340. (3F, W, Su) **Staff**

381. (101) Materials Lab in Special Education. Active participation in selecting, using, and evaluating special materials to promote learning objectives for exceptional children. All areas of special education included. Graduate students must extend laboratory work with field experience. (W, Su) **Staff**

482. (126) Physical Education for the Mentally Retarded. See Physical Education 482. (3F, W, Sp, Su) **Staff**

501. (192) Field Experience with Exceptional Children. Actual contact with exceptional children on and off campus, in public and private institutions. Work with individual children or groups under direction of supervisor. Students may register for more than one quarter for continuing projects. Credit arranged. (F, W, Sp, Su) **Staff**

502. (191) Student Teaching in Special Education. (3, 6, 9, 12F, W, Sp, Su) **Staff**

512. (187) Curriculum for the Mentally Retarded (Educable). Curricula and adaptations in methods of teaching mentally retarded children. Provides helpful guidance both for teachers of classes for these children and for teachers who provide for them in regular school classes. Prerequisite: Sp Ed 301 (or take concurrently), 311 or 611. (3F, Su) **Beasley, Collins**

513. (184) Curriculum for the Mentally Retarded (Trainable). Provides helpful guidance both for teachers of special classes in public schools and teachers in community centers. Prerequisite: Sp Ed 301 (or take concurrently). (3F, Su) **Peterson**

521. (193) Psychopathology of Childhood. A study of pathological behavior in childhood and the role of various professions in diagnosis and treatment of such behavior. (3F, Su) **Publicover**

530. (181) Psychometrics. See Psychology 530. (5F) **Frandsen**

551. (130) Education of the Hearing Impaired. Academic evaluation, guidance and acceleration of the hearing impaired; systematic procedures for optimal development of reading, mathematical, social, and scientific academic skills; cooperation with regular school personnel. (3W, Su) **Berg**

552. (131) School Curriculum for the Hearing Impaired. Emphasis is focused on systematic procedures for specific subject areas such as reading, arithmetic, and social sciences. (3F) **Berg**

581. (128) Administration of Camping for the Handicapped. See Physical Education 581. (3Su) **Staff**

582. (185) Arts and Crafts for Exceptional Children. A laboratory study of methods and procedures of arts and crafts for the exceptional child. Includes art experience with exceptional children in classroom settings. Prerequisite: Sp Ed 301. (3W, Sp, Su) **Butler**

583. (194) Education of the Multiply Handicapped. Educational problems of children having multiple disabling conditions of a nature serious enough to require special programming. This course deals with teaching children who are handicapped in two or more areas of functioning: physical, social, emotional, or intellectual. (3Sp, Su) **Staff**

584. (286) Curriculum and Methods for Gifted Children. A study of curriculum designs and special enrichment programs for gifted students. (3Sp, Su) **Publicover**

588. (198) Practicum in Improvement of Instruction. Designed to facilitate instruction in topic matters and special disabilities areas in specially arranged programs, including telelectures, institutes and workshops. Will provide information or investigate issues. Not duplicated by currently offered courses. Current issues, specific teaching strategies, local school district in-service education are examples of possible programs. Credit arranged. (W) **Staff**

Graduate

601. (288) Counseling and Guidance of Parents of Exceptional Children. Special psychological problems of parents of exceptional children. Suitable counseling practices and supportive resources. (3W, Su) **Fifield**

602. (296) Diagnostic Programming of Instruction. Approach to curriculum in which diagnosis and instruction are welded as a unit into the regular teaching procedures. Prerequisite: Sp Ed 302. (3F) **Hofmeister**

603. (284) Practicum in Special Education — Clinical Teaching. Supervised practicum in a clinical teaching setting. Prerequisites: 301, 302, 303 and curriculum course in the area of concentration. (3-12F, W, Sp, Su) **Staff**

611. (224) Mental Retardation: Etiology and Treatment. Characteristics, identification, and treatment of the mentally retarded. Emphasis upon the education, social, and psychological problems in the treatment and control of the mentally handicapped. (3F, Su) **Peterson**

612. (287) Basic Problems in Teaching the Mentally Handicapped. Analysis of the emotional and social aspects of the mentally retarded child as they relate to his perception of himself and of his learning difficulties. The necessity of understanding how these children develop concepts which are essential to their learning. (3Sp, Su) **Peterson**

613. (289) Diagnosis of Mental Retardation. Educational, psychological, and social diagnosis. Prerequisites: Psychology 310, Sp Ed 512. (3W, Su) **Kesler, Peterson**

614. (298) Vocational Habilitation for the Mentally Retarded. Designed to aid teachers, vocational counselors, and related disciplines in establishing and operating community-oriented work-study programs in secondary schools. (3Sp, Su) **Peterson**

618. (new) Practicum in Child Psychology. See Psychology 618. (3F) **Osborne**

619. (new) Practicum in Child Psychology continuation) See Psychology 619. (2W) **Osborne**

621. (291) Assessment of Complex Learning Behavior Disorders. Emphasis on diagnostic procedures used in school settings for planning and individualized programs. Intensive practice in interpretation of tests used in planning for disturbed and perceptually handicapped children. Prerequisite: Sp Ed 301 or instructor's consent. (3F, Su) **Staff**

622. (292) Education of Emotionally Disturbed Children (Elementary Age). Methods and procedures for these children in regular classrooms, special classrooms, and institutions. Prerequisite: Sp Ed 621. (3W, Su) **Publicover**

623. (293) Education of the Socially Maladjusted. Specific emphasis on adolescent programs in institutions such as mental hospitals, industrial schools, etc. Legal and administrative aspects of programs for disturbed adolescents. Prerequisite: Sp Ed 621. (3W, Su) **Publicover**

635. (213) Diagnosis of Reading. See Elementary Education 635. (3F, Su) **Mower**

636. (214) Methods of Instruction in Remedial Reading. See Elementary Education 636. (3W, Su) **Mower**

637. (216) Practicum in Remedial Reading. See Elementary Education 637. (3W, Su) **Mower**

641. (225) Sociology of Deviant Behavior. See Sociology 641. (3) **Pennock**

641. (297) Seminar on Disadvantaged Children. For teachers and supervisors of disadvantaged children in which the advanced students will study under a team of professors and will do original work in the fields of curriculum, community action programs, tests and measurements, legal and administrative aspects of programs for disadvantaged children. (3Sp) **James**

642. (299) Teaching Language to the Disadvantaged. Teaching English to educationally or culturally deprived children, with emphasis on background materials for enlargement of understanding and continued independent study. Provides background for study of generative grammars. Historical changes, psycholinguistics, semantics, and the transfer of theory into plans, materials, practice, and evaluation. (5F) **James**

661. (261) Organization and Administration of Special Education. See Educational Administration 661. (3F, Su) **Staff**

665. (225) Improvement of Reading in the Elementary School. See Elementary Education 665. **Allred, Mower, Shaw**

666. (200) Principles of Learning in Teaching. See Psychology 666. (3W) **Publicover**

666. (266) Applied Research in Education. See Educational Administration 666. (3F, Sp, Su) **Shaver**

667. (267) Research in Psychology and Education. See Educational Administration 667. (3F, Sp, Su) **Shaver**

668. (new) Educational Diagnosis of Learning Difficulties. See Psychology 668. (3W, Su) **Hofmeister**

681. (294) Seminar in Special Education. (3W, Sp, Su) **Staff**

682. (290) Classroom Management of Mental Health. Teachers and pupils find patterns of interaction which permits each to achieve learning objectives. Community mental health resources. Systems of observing, graphing, and commenting on behavior. This behavior study is often described as deviate and ascribed to children and adolescents with problems in learning and behavior. (3F, Su) **Staff**

684. (295) Methods in Presenting Literature to the Gifted. Designed to review the characteristics of the gifted, to examine his reading habits, to find methods of identifying superior and creative readers, and to improve upon discussion techniques suitable for elementary and junior high school students. (3W, Sp) **Staff**

691. (283) Readings and Conferences. Individually directed study. Credit arranged. (F, W, Sp, Su) **Staff**

697. (285) Research and Thesis Writing. Credit arranged. (F, W, Sp, Su) **Staff**

699. (400) Continuing Graduate Advisement. For students in final stages of preparation of their doctoral dissertations.

713. (new) Advanced Exceptional Child. See Psychology 713. (3F) **Fifield**

781. (394) Research Seminar in Special Education. Research critiques, independent research project reports, departmental research focus, interaction of graduate students with senior staff members and research methodology. Mandatory course for resident graduate doctoral students in special education. Prerequisite: Permission of graduate committee. (2F, W, Sp, Su) **Staff**

792. (385) Field Studies and Thesis. Individual work on research problems in EdD programs. Credit arranged. (F, W, Sp, Su) **Staff**

793. (391) Internship in Special Education. Professional and supervised intern experience for doctoral programs. (3-15F, W, Sp, Su) **Staff**

797. (395) Research and Thesis. Variable credit for dissertation project in connection with doctoral program in special education. (18-30F, W, Sp, Su) **Staff**

*Department of

Speech

Head: Professor Rex E. Robinson
Office in Main 33

Professor Burrell F. Hansen

Associate Professor Arthur L. Higbee

Assistant Professors Gerald Allen, Farrell Black, Charles Heimerdinger, W. Ronald Ross

Instructors Barbara Hales, Raymond Heidt, Lynne Paoletti, Arthur Y. Smith

Degrees: Bachelor of Arts (BA), Bachelor of Science (BS), Master of Arts (MA), Master of Science (MS)

Majors: Speech, Speech-Theatre Arts Composite

No one skill more influences personal and professional evaluation than one's ability to speak well. Professional competence and personal substantiality are significantly obscured or disclosed by one's speech. Speech may enhance as well as betray.

Service courses in general speech technique and practice are offered to students at large. Prospective teachers register for courses in public speaking, oral interpretation, and story telling. "Technical and Professional Speaking" and "Discussion and Conference Leadership" are examples of classes offered for business and professional students.

The department offers major concentration in Interpretation, Public Address, and Radio and Television Broadcasting. The student may also obtain a composite major in Speech and Theatre Arts.

Major extracurricular activities for which the Speech Department has responsibility are the program in debating and related contest activities, and the annual Poetry Speaking Festival.

*In College of Humanities, Arts and Social Sciences.

Bachelor of Arts and Science Degrees. At least 45 credits are required for a departmental major or a teaching major in Speech and are as follows: Public Speaking, ten credits (Speech 525 and 509 or 313 required of all majors); Interpretation, ten credits (Speech 201 and 524 required of all majors); Theatre Arts, eight credits (Theatre Arts 150, 121, and 546 or Theatre Arts 150 and 406); Communicative Disorders, three credits (CD 100, required of all majors); Radio and Television, six credits; elective courses in Speech, eight credits. Courses in Dramatic Literature, five credits, and Teaching of Speech, three credits, are recommended in some cases.

An "application for admission to teacher education" should ordinarily be completed before the Junior year (see College of Education for requirements). Approval is a prerequisite to teacher certification candidacy and to enrollment in Education and Psychology courses.

If emphasizing Radio-Television, the Speech major is required during his Junior and Senior years

to obtain one year's broadcast experience at a commercial or educational television or radio station.

A composite Speech - Theatre Arts major requires the following Speech courses: Speech 101, five credits; Speech 201, five credits; Speech 524, five credits; Speech 525, five credits; Communicative Disorders 100, three credits; Speech 187, three credits; Speech 581, three credits. Those planning to certify for teaching should also take Speech 523, Teaching of Speech, three credits, although this may be taken as Education credit if desired. Students taking the Speech-Theatre Arts composite major may take as many as 40 credits in Speech if they desire to do so. Suggested electives for such additional credits include Speech 109, 121, 509, 510, and 313, all three-credit courses. For Theatre Arts courses needed for the Speech-Theatre Arts composite major, see the Theatre Arts Department in this catalog.

Graduate Study

The Department of Speech offers the Master of Science degree and the Master of Arts degree in the following fields: interpretation, public address and broadcasting.

Graduate students taking Speech courses in the 500 series, usually taken by upper division students, will be expected to present additional projects at the option of the instructor.

Speech Courses

Undergraduate

101. (1) Fundamentals of Speech. Study and training in voice, body, language, meaning and personal adjustment as applied to speaking, reading, group leadership and broadcasting. Should not be taken by Speech majors. (5F, W, Sp)
Black, Heidt, Heimerdinger, Paoletti, Smith

105. (5) Public Speaking. Emphasizes audience analysis, selection of subject and purpose, selection of varied and appropriate content material, and organization. Students will present types of speeches most commonly necessary in typically encountered audience situations. Should not be taken by those who have taken Speech 101. (3F, W, Sp)
Paoletti, Ross, Smith

109. (9) Voice and Diction Improvement. Diagnosis of individual problems, theory and practical exercises. Not intended for those with defects in speech cared for by the Speech and Hearing Center. (3Sp) **Hales**

116. (16) Dialect. The most prominent dialect works of Burns, Kipling, Drummond, Riley, Runbar, Harris, Kirk and others. (3Sp) **Staff**

121. (21) Intermediate Public Speaking. Work with types of speaking that are interesting and useful; determining the length of speeches and times to speak within the framework of certain minimum requirements. Emphasizes developing skill in speech presentation. Prerequisite: Speech 101 or 105. (3F, W, Sp)
Black, Paoletti, Robinson, Smith

181. (81) Introduction to Broadcasting. Survey and analysis of station and network organizations, operations, programming and financing. Inquiry into radio and television as factors in social action. (3F, Sp) **Hansen**

183. (85) Broadcast Operation. Audio and video control operations, including microphone set-ups, audio console operations, TV camera and film chain operations. Two-hour lecture and three-hour lab per week. (3F) **Staff**

185. (82) Radio-TV Performance. Practice in, and analysis of, the speech skills required in broadcasting; directed toward development of acceptable standards of voice, articulation, pronunciation, and body control. (3W, Sp)
Ross

187. (83) Radio Production. Principles and practices in uses of voice, music, and sound to create radio programs. Special attention to assisting the speech teacher adapt professional production techniques to classroom use for motivating and training students. (3F, Sp)
Allen

192. (12) Individual Problems. Attention given in private to help eliminate defects and develop skill in speech. Recommended for anyone needing individual speech instruction and for majors. Special fee. May be taken more than one quarter. Credit arranged.
(F, W, Sp) **Staff**

201. (4) Principles of Oral Reading. A preparatory course for understanding and appreciation of the printed page. (5F, W, Sp)
Black, Paoletti, Ross, Smith

301. (101) Parliamentary Procedure. (1F) **Robinson**

305. (105) Technical and Professional Speaking. Prerequisite: Speech 101 or 105. (3F, W, Sp) **Robinson**

***313. (113) Argumentation.** Information and practice in techniques of analysis, investigation, evidence, reasoning, briefmaking, refutation and construction and delivery of the argumentative speech. (3F) **Robinson**

315. (115) Intercollegiate Debating. Members of debating squads may receive not more than three credits in any one year. (3F, W, Sp) **Robinson**

392. (112) Private Instruction. Individual attention given to eliminate defects and develop skill in speech. Recommended for anyone needing individual speech instruction and for Speech majors. Special fee. May be taken more than one quarter. Credit arranged. (F, W, Sp) **Staff**

490. (186) Radio - Television Training. Students whose training and ability qualify them for actual broadcast work are assigned staff work in a broadcast station. Registration only by permission of instructor. Time and credit arranged. (F, W, Sp) **Staff**

500. (190) Problems in Speech. Selected work, individually assigned, handled and directed. Prerequisite: Instructor's consent. Credit arranged. (F, W, Sp) **Staff**

***509. (109) Discussion and Conference Leadership.** Application of various group discussion techniques to current problems. Workshop procedures offer practice in preparation, use and evaluation of methods. (3F) **Robinson**

***510. (110) Play Reading.** Attention given to cutting and building for public programs. (3Sp) **Staff**

511. (111) Psychology and Semantics of Speech. Principles of psychology that underlie speech. Personal adjustment through speech. An insight into the process of symbol use. (3W) **Staff**

517. (117) Persuasion. Information and practice in the techniques of influencing thought and behavior by speech. Particular attention to the problems of audience analysis, psychological aspects of persuasion, and technical considerations. (3Sp) **Heimerdinger**

518. (118) Storytelling. Analysis of classification of typical stories with reference to periods of the child's development. Consideration is given stories of western pioneer life. Especially for the student teacher, recreation leader, church activity leader, librarian, and parent. (5F, W, Sp) **Black, Hales**

519. (118) Storytelling. (3Su) **Staff**

522. (122) Reading Poetry to Children. Oral reading principles as applied directly to children's poetry. Choral reading techniques applicable to classroom situations and programming. Designed especially for teachers, prospective teachers, librarians and parents. (3F, W, Sp) **Hales, Ross**

523. (123) Teaching of Speech. Methods and problems peculiar to teaching of speech both in secondary schools and in speech areas for Freshman English work in the University and in basic speech courses at the college level. Organization of courses and lesson plans included. Prerequisite: Instructor's consent. (3F) **Black**

524. (124) Advanced Interpretation. Mastering significant selections from great writers. Reading from manuscript and from memory. (5F, W) **Ross**

525. (125) Speech Composition. Advanced theory and practice of public speaking. Building and delivering several short speeches and reading selected masterpieces from the world's public speaking literature. Prerequisites: Junior standing and Speech 101, or 105. (5W, Sp) **Robinson**

526. (125) Speech Composition. (Off campus only) Three credits. **Staff**

527. (123A) Teaching Speech in the Elementary School (Ind. Study only) Three credits. **Staff**

533. (133) Directing Forensic Programs. (3Su) **Staff**

581. (181) Television Production. Development of the program idea, scripting, casting, rehearsal and coordination of the technical aspect of TV program production. Prerequisite: Upper division standing. (3W, Su) **Allen**

583. (185) Advanced Radio-TV Production. Practice in meeting specialized problems in the production of radio and television programs. Concepts and methods in directing. Prerequisite: Speech 581. (3Sp) **Hansen**

585. (187) Television Film Techniques. Selection and use of lenses, lighting, meters and camera in production of news film, documentary footage, and program film for television. Standards and methods in shooting, editing and projecting 8 and 16 mm. motion picture film, 35 mm. slides, single system sound film recording and special effects. (3Sp) **Hansen**

587. (184) Educational TV and Radio. Principles and methods in development and production of radio and television materials for educational uses. Methods for effective classroom utilization of audio and visual materials and programs. (3W, Su) **Hansen**

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*Taught 1971-72.

590. (188) Television Internship. In-service training in a commercial television station in which staff assignments are carried out under supervision of station personnel. Limited to Seniors and graduate students. Registration only after acceptance by the department and the station. Up to 12 credits allowed undergraduate students. Up to nine credits allowed graduate students. Time and credit arranged. (F, W, Sp, Su)

Graduate

680. (210) Seminar in Research Methods in Speech. (2) **Staff**

684. (224) Seminar in Oral Interpretation. (2F) **Ross**

****685. (225) Seminar in Rhetorical Theory.** (2W) **Robinson**

686. (230) Seminar in Radio and Television. (2W) **Hansen**

687. (235) Seminar in British and American Oratory. Study of the "classics" of British and American oratorical literature. Attention given to the backgrounds of the speakers, the circumstances surrounding the speech occasion, and analysis of the speeches. Reference to contemporary British and American public address. (2Sp) **Heimeringer**

690. (290) Research Studies. Advanced research in speech. Credit arranged. (F, W, Sp) **Staff**

697. (201) Thesis. (2-5F, W, Sp) **Staff**

799. (400) Continuing Graduate Advisement. Credit arranged.

**Taught 1972-73.

**Department of*

Theatre Arts

Head: Professor Floyd T. Morgan
Office in Fine Arts Center 232

Associate Professor W. Vosco Call
Assistant Professor LeRoy C. Brandt
Theatre Designer Sidney G. Perkes
Artist-in-Residence in Dance Marion Andersen
Wardrobe Mistress Elva Hatch
Degrees: Bachelor of Arts (BA), Bachelor of Fine Arts (BFA), Master of Arts (MA), Master of Fine Arts (MFA)
Majors: Theatre, Theatre Teaching, Theatre Arts-Speech Composite

The Theatre Arts Department curriculum and the play and dance productions it sponsors are planned to give students competency and experience in all aspects of theatre. Courses in theatre history, literature and appreciation; acting, directing and dance; theatre design, technical practice and management are offered. Each year Utah State Theatre and Dance Theatre present a number of plays and dance concerts. During the Summer Quarter the department offers intensive programs in theatre and dance. Qualified students selected as members of the Old Lyric Repertory Company devote their full time to theatre work and get practical experience as actors, designers and production assistants. The Summer Quarter classes in ballet, modern and ethnic dance

*In College of Humanities, Arts and Social Sciences.

are taught by professional dancers and master teachers.

Theatre courses and productions are housed in two unique and functional theatre structures. The new Chase Fine Arts Center provides students with an adaptable thrust stage theatre, class and seminar rooms, design and dance studios, costume and scene shops, comfortable dressing rooms, modern light and sound control boards. The Lyric, a small, elegant Victorian proscenium theatre owned by Utah State University and located in downtown Logan, is also used for Utah State Theatre and Old Lyric Repertory Company plays.

Undergraduate Study

Bachelor of Arts

Theatre Teaching Major: Th Arts 121, 150, 505, 506, 507, 520, 546, 598 (22 credits); 124, 524, (two credits); eight credits to be chosen from Th Arts 152, 550, 551, 552, 553, 554, 555; electives in Th Arts courses (seven credits); Speech courses (eight credits; foreign language (24 credits).

Theatre Arts-Speech Composite Major: Th Arts 121, 150, 505 or 506, 507, 546, 598 (19 credits); 124, 524, (two credits); six credits chosen from Th Arts 152, 520, 550, 552, 553, 554, 555; foreign language (24 credits). For Speech courses required for the Theatre Arts-Speech Composite Major see Speech Department in this catalog.

Bachelor of Fine Arts

Theatre Major: Th Arts 120, 121, 150, 505, 506, 507, 520, 546 (27 credits); 124, 524, (two credits); seven to nine credits chosen from Th Arts 152, 550, 551, 552, 553, 554, 555, 598; electives in Th Arts courses (seven to nine credits); Speech 525, 581 (eight credits).

Theatre Arts Minors

Theatre Teaching Minor: Th Arts 100, 121, 150, 546, 598 (14 credits); 124, 524, (two credits); six credits to be chosen from Th Arts 152 154, 466, 552, 554, 555, 558.

Theatre Minor: Th Arts 100, 121, 150, 546 (11 credits); 124, 524, (two credits); electives in Th Arts courses (four credits).

Graduate Study

The Department of Theatre Arts offers advanced work leading to the Master of Arts and Master of Fine Arts degrees. The graduate program prepares the student for work in educational and nonprofessional theatres. It offers training and experience in playwriting, directing, acting, designing and advanced technical practice.

During the first quarter of residence, and before admission to candidacy for either the Master of Arts or the Master of Fine Arts degree, the candidate is required to take the Graduate Record Examination given by the School of Graduate Studies and two diagnostic examinations given by the Theatre Arts staff. The first of these department examinations is a comprehensive written one covering theatre history, literature and criticism, acting, directing, scenery and costume design, lighting, make-up, technical practice, current drama and theatre. The second examination is an oral skills tests in which the student demonstrates before a departmental committee his competency in voice and diction, extemporaneous speaking and interpretive

reading or acting. The results of these examinations are used to assist the student and his faculty adviser in planning a program of study and in selecting a thesis subject or creative project.

Candidates for the Master of Arts degree are required to present from the Department of Languages a statement of proficiency in reading one foreign language. The language should be one taught regularly at USU.

The candidate for the Master of Arts degree may, with the approval of his supervisory committee, present a thesis or a thesis alternate. The candidate for the Master of Fine Arts degree presents a creative project in playwriting, directing, acting, scene, costume, lighting design or advanced technical practice. As part of this project and in lieu of a thesis, the candidate submits an original long play or its equivalent, a production book or a project portfolio.

Fine Arts Tours

Theatre Arts majors and minors are encouraged to participate in the annual Fine Arts tours. Detailed information available in the office of the Director of Tours.

Theatre Arts Courses

Undergraduate

101. (1) Understanding Theatre. Study of dramatic art and contributions made to it by playwrights, actors, directors, designers, technicians and theatre builders. (3F, W, Sp, Su) **Staff**

102. (10) Drama Appreciation. For students who wish to enhance their enjoyment of plays. Study of the major forms and styles of drama, reading and discussion of selected modern plays. (3W) **Morgan**

103. (2) Current Drama. Study of recent and current theatres: Broadway, resident, community and educational. Reading and criticism of selected plays of modern-day playwright. (3Sp) **Morgan**

120. (20) Voice for Theatre. Individual and group exercises for the improvement of projection, diction, flexibility and variety. (2F) **Morgan**

121. (44) Fundamentals of Acting. Development of the actor's physical, mental and emotional resources. (3F, W) **Call**

122. (46) Intermediate Acting. Continuation of Th Arts 121 with emphasis on characterization. (3W) **Call**

124. (24) Theatre Practice. Supervised production crew and staff work. Prerequisite: Permission of Theatre Arts staff. (1F, W, Sp, Su) **Staff**

150. (50) Stagecraft. Technical organization and planning of the play production. Construction, rigging and shifting of scenery selection and building of properties. (2F, Sp) **Brandt**

152. (52) Make-up. Practice of make-up for the stage. Recommended for prospective directors of school, church and community theatres. (1F) **Perkes**

154. (54) Children's Theatre. Theory and practice in the selection, preparation and presentation of children's plays. Recommended for prospective elementary school teachers. (3F) **Call**

170. (70) Beginning Ballet. Students accepted by permission of the instructor. Course may be repeated a maximum of three times for credit. (1F, W, Sp, Su) **Staff**

172. (72) Dance for Theatre. Body movement designed for the needs of the actor. Emphasis on the creative approach to movement as it is utilized to project character emotion and mood. (1F, W, Sp, Su) **Staff**

301. (101) Advanced Repertory Modern Dance. Advanced technique and movement patterns for those who have passed the intermediate level in modern dance. Emphasis on technical proficiency for performance. Students admitted by permission of instructor. (2F, W, Sp, Su) **Anderson**

370. (170) Intermediate Ballet. Students having completed Beginning Ballet (Th Arts 170) or transferring with similar ballet experience will be permitted to enroll. While ballet fundamentals are still emphasized, students spend more time preparing for actual performance. (1F, W, Sp, Su) **Staff**

371. (171) Advanced Ballet. Students concentrate on the actual performance of ballet compositions. Prerequisites: Th Arts 170 and 370, or equivalent. (1F, W, Sp, Su) **Staff**

372, 373. (172, 173) Dance for Theatre. Body movement designed for the needs of the actor. Emphasis on the creative approach to movement as it is utilized to project character emotion and mood. (1F, W, Sp, Su) **Staff**

374, 375, 376. (174, 175, 176) Concert Dance. For selected students who have completed the required classes in modern dance and who wish to appear in concerts featuring all contemporary, serious dance forms. Students admitted by permission of instructor. (1F, W, Sp, Su) **Staff**

466. (166) Drama Production. Problems of play selection, casting, acting, directing, scenery construction and painting, lighting, costume and make-up. Recommended to drama teachers, MIA drama directors, and recreation leaders. (5W, Su) **Morgan**

505, 506, 507. (100, 102, 104) History of Theatre and Drama. Fall: Classical, Oriental, and Medieval; Winter: Early Renaissance through 18th century; Spring: 19th century to the present. (4F, 4W, 4Sp) **Morgan**

520. (120) Fundamentals of Design for the Theatre. Projects in sketching, rendering, drafting, perspective, model making, scene painting techniques. Prerequisite to Th Arts 550, 553 and to production thesis projects. (2F) **Morgan, Perkes**

524. (124) Theatre Practice. Supervised production crew and staff work. Prerequisite: Permission of Theatre Arts staff. (1F, W, Sp, Su) **Staff**

544. (144) Advanced Acting. Emphasis on the creative approach to acting, analysis and creation of the role and ensemble playing. (3Sp) **Call**

546. (146) Directing. Prerequisites: Th Arts 121, 150. (3W) **Call**

548. (148) Private Instruction. Individual tutoring to develop competence in voice, acting, directing, scenic and costume design. Special fee. Credit arranged. (F, W, Sp) **Staff**

550. (150) Scene Design. Development of scenic designs through color sketches, plans and models. Practice in scene painting techniques. Survey of the history of stage decoration. (3W) **Perkes**

551. (151) Historic Costume for the Stage. Historical survey of the development of costume from the Egyptians to the 1900's, with a practical approach to the reproduction for stage use of each period, as well as a study of the manners of the period. (3F) **Perkes**

552. (152) Stage Costuming. Pattern drafting, construction of stage costumes and accessories, organization and care of costume wardrobes. (2W) **Perkes**

553. (153) Costume Design. Theory and practice in the design and selection of costumes for non-realistic, historical and modern plays. Relationship of costume to character and production. Registration by consent of instructor. (3Sp) **Perkes**

554. (154) Stage Lighting. Lighting design, mounting of instruments and operation of control boards. Prerequisite: Th Arts 150 or instructor's consent. (2W) **Brandt**

555. (156) Theatre Organization and Management. Study of the managerial aspects (organization, promotion, financing) of educational and community theatres. (2F) **Call**

558. (158) Creative Dramatics. Guidance of children in the creation of scenes and plays with improvised dialogue and action. Application of creative dramatics to the classroom situation. Recommended for prospective elementary school teachers. (2Sp) **Call**

560. (160) Playwriting. Analysis of dramatic structure. (3W) **Morgan**

590. (190) Problems in Drama. Credit arranged. (F, W, Sp, Su) **Staff**

592. (192) Projects in Theatre. Advanced work in playwriting, acting, directing, scene design, costume design, make-up, costume construction, lighting, technical practice and theatre management. Projects may be done in connection with Utah State Theatre productions or they may be independent endeavors. A total of nine credits may be earned in this course. Credit arranged. (F, W, Sp, Su) **Staff**

596. (196) Advanced Directing. Practice in stage direction. The student selects, casts, directs, and presents short plays and scenes. Prerequisite: Th Arts 546. (3F) **Call**

598. (194) Problems of Drama Directors. Play selection, organization of the production, drama club activities, simplification of settings, lighting, costumes, financing, auditorium and stage facilities, central staging, audio-visual aids, and bibliography are studied. Recommended for directors and prospective directors of high school, church, and community theatres. (3Sp) **Morgan**

Graduate

680. (200) Seminar in Drama. Credit arranged. (F, W, Sp, Su) **Staff**

681. (201) Dramatic Theory and Criticism. Explores the traditional works of critical theory that relate to the theatrical arts beginning with Aristotle's Poetics. Prerequisites: Th Arts 505, 506, 507. (3Sp) **Call**

690. (202) Research Studies. Prerequisite: Instructor's consent. Credit arranged. (F, W, Sp, Su) **Staff**

692. (292) Projects in Theatre. Credit arranged. (F, W, Sp, Su) **Staff**

697. (204) Thesis. Credit arranged. (F, W, Sp, Su) **Staff**

699. (400) Continuing Graduate Advisement. Credit arranged. F, W, Sp, Su) **Staff**

*Department of

Veterinary Science

Head: Professor Merthyr L. Miner
Office in Veterinary Science 101

Professors Wayne Binns,[1] Joseph T. Blake, James L. Shupe, Don W. Thomas

Associate Professors Jay W. Call, Lynn F. James,[1] A. Earl Johnson,[1] Ross A. Smart

Assistant Professors Raghubir P. Sharma, James A. Thomas

Research Associates Arland E. Olson, W. Robert Thornley

Collaborators[2] R. Thair Carver, Dale Christiansen

Degree[3]**:** Bachelor of Science (BS)

Major: Veterinary Science

The primary responsibilities of departmental veterinarians to students are: 1) guidance of pre-veterinary medical students, 2) teaching veterinary medical courses to undergraduates and graduates majoring in biological science curriculums, and 3) training of graduate students in the interdepartmental curriculum in Toxicology.

A three-year pre-veterinary medical curriculum within the department (tabulated below) is designed to prepare students for admission to any one of the veterinary schools in the United States. Variations of the curriculum to better fit a particular student's situation are possible, but counsel is imperative. By remaining a fourth year a student can graduate from USU with a BS degree in some science-related field, then apply for admission to a veterinary school. The BS degree in Veterinary Science from USU is available to students who have completed the three-year pre-veterinary curriculum, requirements for graduation, and one year in some veterinary school.

Following completion of pre-veterinary and professional veterinary school curriculums a DVM (Doctor of Veterinary Medicine) degree is awarded.

Utah participates in WICHE (Western Interstate Commission for Higher Education), which provides state subsidization of five Utah resident students entering each year into any of the three western veterinary schools. The subsidy pays the out-of-state tuition. Application for WICHE participation is due December 1 for the following academic year. Assistance in applying is available through the Veterinary Science departmental office.

Veterinary medicine is an interesting, exciting, rewarding, and opportune profession. Graduates can enter private practice, become specialists, or accept employment with any one of many governmental agencies or private enterprises.

*In College of Agriculture.

[1]Collaborators, Veterinary Science Research Division, U.S.D.A.

[2]Animal Health Division, U.S.D.A.

[3]Master's and doctorate degrees available through an interdepartmental curriculum in Toxicology.

Pre-Veterinary Curriculum

FRESHMAN YEAR

Courses	Credits
English 101, 102, 103	9
Math 105, 106, 220	13
Chemistry 121, 122, 123	15
Animal or Dairy Science	5
Social Sciences or Humanities	3
MS, AS, or HPER	3-6
	48-51

SOPHOMORE YEAR

Physics 111, 112, 113	15
Biology 120, 121	10
Chemistry 331, 332, 333	11
Social Sciences or Humanities	9
Electives	5
	50

JUNIOR YEAR

Chemistry 360, 670	9
Animal Science 440, 441	6
Biology 512, Zool 557	10
Social Sciences or Humanities	13
Electives (Marketing, Business, Language)	12
	50

Veterinary Science Courses

Undergraduate

120. (20) Anatomy and Physiology of Animals. Systematic study of body structure and function. Comparison of cattle, horses, sheep, swine, poultry, pets, man. A basic biology course. Four lectures, one lab. (5W) **Blake**

300. (120) Animal Hygiene. Animal sanitation and disease control, agencies, and regulations. First aid, minor surgery, and immunization demonstrations on farm animals. Prerequisite: Vet 120 or equivalent. Three lectures, one lab. (4Sp) **Call**

320. (143) Artificial Insemination of Domestic Animals. Principles and practices in artificial insemination of farm animals. Prerequisite: Vet 120 or equivalent. One lab. (1Sp) **Call, Foote**

520. (142) Reproduction of Domestic Animals. Physiology of reproduction and control methods in farm animals. Prerequisites: Vet 120 or equivalent and organic chemistry. Two lectures, one lab. (3Sp) **Call, Foote**

530. (195) General Pharmacology. Principles; clinical application and research methods. Prerequisites: Chemistry 670, Physiology 502. Three lectures, two labs. (5W) **Sharma, Blake**

570. (140) Veterinary Parasitology. Description, pathogenicity, life cycle, and control methods of internal and external parasites of domestic animals. Four lectures, one lab. (5F) **Miner**

590. (200) Special Problems. Any special study in veterinary medicine not taught in the formal courses. (1-3F, W, Sp) **Staff**

Graduate

620. (242) Reproductive Physiology. In-depth study of reproductive physiology; special emphasis on experimental animals. Prerequisites: Vet 120 or equivalent, Physiology 502, Organic Chemistry. Three lectures, one lab. (4W) **Call, Ellis, Foote**

650. (230) General Pathology. Basic understanding of disease in animals, fundamental principles of structural and functional mechanisms of abnormal reactive processes. Prerequisites: Zoology 557 and 567. Three lectures, two labs. (5W) **Shupe**

651. (231) Special Pathology. Correlate abnormality with causes; disease processes studied by systems, organs, and cells. Prerequisite: Vet 650. Three lectures, two labs. (5Sp) **Shupe**

652. (232) Toxicological Animal Pathology. Correlation of clinical signs and anatomic and physiologic changes induced by toxicants. Prerequisite: Vet 650. Three lectures, two labs. (5W) **Sharma, Shupe**

660. (280) Principles of Toxicology. Mechanisms of action and effects of toxicants on living organisms. Prerequisites: Vet 530. Four lectures, one lab. (5Sp) **Sharma**

680. (210) Seminar in Toxicology. (1W, 1Sp) **Staff**

697. (210) Thesis Research. Credit arranged. **Staff**

797. (210) Dissertation Research. Credit arranged. **Staff**

698-798. (210) Research Consultation. Credit arranged. **Staff**

699-799. (400) Continuing Registration. Credit arranged. **Staff**

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*Taught 1971-72.
**Taught 1972-73.

*Department of

Wildlife Resources

Head: Professor William F. Sigler
Office in Forestry-Zoology 163

Professors George H. Kelker, Jessop B. Low, John M. Neuhold, Allen W. Stokes, Frederic H. Wagner

Associate Professors David F. Balph, William T. Helm, Derry D. Koob, Robert H. Kramer, Dietland Muller-Schwarze

Assistant Professors Kent W. Bridges, J. Anne Holman, J. Juan Spillett, Clair B. Stalnaker, Michael L. Wolfe, Gar W. Workman

Collaborators Wayne H. Bohl, Ron Goede, James M. Laughlin

Teaching Assistants Paul Holden, Charles Ebersole

Degrees: Bachelor of Science (BS), Master of Science (MS), Doctor of Philosophy (PhD)

Majors: Wildlife Resources, Fishery Biology, Wildlife Biology, Ecology

Of foremost importance is the philosophy of the Department of Wildlife Resources that our natural, renewable resources are produced to be used in a manner consistent with their conservation and perpetuation.

The department participates in a Cooperative Wildlife Research Unit, a Cooperative Fishery Unit, and in Wildlife Extension.

The department operates or has access to the following research facilities: a large aquarium operated as an aquatic toxicology and physiology laboratory, the Bear Lake Biological Laboratory, an experimental fish hatchery, a river studies laboratory, a radioecology and behavior laboratory, and behavior and ecology research field station.

Wildlife Resources graduates are employed by the state and federal government as managers of natural resources. They also find work in industry and teaching. The rising concern over environmental quality should open up new careers both in research and management.

*In College of Natural Resources.

Undergraduate Study

The first two years include courses designed to give the student a sound scientific background. By the beginning of the Junior year, the student should decide with his adviser upon a course of studies for the final two years. Besides choosing an option, a student will want to select courses to meet his particular professional goal.

During the Freshman and Sophomore years a student should complete the following:

FRESHMAN AND SOPHOMORE YEARS

Courses			Credits
Engl	101, 102, 103	Freshman English	9
Math	101, 105	College Algebra	5-8
Math	106	Plane Trigonometry	3
Chem	111, 112	General Chemistry	10
Chem	141	Elementary Organic Chemistry	5
Biol	120	General Biology	5
Bot	110	Elementary Botany	5
Zool	160	General Zoology	5
Ento	129	General Entomology	5
Bot	420	Taxonomy of Vascular Plants	5

Physics	120	General Physics	5
Econ	200	General Economics	5
For Sci	101	Survey and Orientation	1
Range	101	Elements of Range Science	1
Wildlife	100	Elements of Wildlife Mgmt	1
PE, MS, or AS			3
Group Requirements and Electives			17-20

Students wishing to prepare themselves for graduate work should consider taking Math 220, 221 and 222, Analytic Geometry and Calculus, in addition to Algebra and Trigonometry; Chemistry 121, 122, and 123, Chemical Principles and Qualitative Analysis; Physics 211, 212, and 213, General Physics; and Applied Statistics 431, 432, and 433, Statistical Methods.

Electives from associated departments are chosen with approval of the major professor. Recommended electives include all courses in Wildlife, Range or Forest Science; Applied Statistics 351, 431, 432 and 433; Chemistry: Organic, Physical, or Biochemistry; Civil Engineering 443, Water Resource Engineering Hydrology; Animal Science 440, Principles of Nutrition; Geology 111, Physical Geology; Art 140, Photo Fundamentals; Physical Education 132, Self-Defense; Math 242, Introduction to Mathematical Analysis; Taxonomy of Wildland Plants; Bacteriology 301, General Microbiology; Bacteriology 192, Aquatic Microbiology; Entomology 537, Aquatic Entomology, and most courses in Zoology.

Required Courses for Wildlife Students

Courses			Credits
Wildlife	300	Principles of Wildlife Mgmt.	3
Wildlife	384	General Ecology	5
Wildlife	385	General Ecology Lab	1
Ap St	351 or 431	Statistical Methods	4
Engl	303	Technical Writing	3
Engl	501	Creative Writing	3
	or	or	
Journ	430	Magazine Article Writing	3
Speech	305	Technical and Professional Speaking	3
Wildlife	490	Wildlife Seminar	1

In addition to these courses, one or both of the following options must be chosen:

GAME MANAGEMENT OPTION

Wildlife	430	Mgmt of Wildlife Habitat	3
Wildlife	431	Mgmt of Wildlife Population	4
Wildlife	432	Mgmt Aspects of Wildlife Behavior	3
Wildlife	360	Limnology	5
Soils	358	General Soils	5
Any two upper division Zoology courses			6-10

FISH MANAGEMENT OPTION

Wildlife	560	Fishery Biology	4
Wildlife	570	Fishery Principles	4
Wildlife	571	Fishery Techniques	4
Wildlife	360	Limnology	5
Wildlife	361	Limnology Lab	1
Zool	559	Comparative Anatomy	5
Zool	575	Ichthyology	5
Soils	358	General Soils	5
or	or	or	
Geology	111	Physical Geology	5

Graduate Study

The advanced degrees, Master of Science and Doctor of Philosophy in Fishery Biology, Wildlife Biology, or Ecology are granted upon completion of a prescribed course and fulfillment of the Graduate School requirements.

Assistantships. The Utah Cooperative Wildlife Research Unit and the Utah Cooperative Fishery Unit provided a limited number of research assistantships for graduate students in the department. The Wildlife Resources Department has two teaching assistantships. In addition, there are grants from the University and outside agencies available to support graduate students. A prospective student should submit formal application with a transcript of college credits references and Graduate Record Examination scores to the dean of the School of Graduate Studies.

Inquiry about admission and financial assistance should be directed to the head of the Department of Wildlife Resources.

Wildlife Resources Courses

Undergraduate

100. (1) Elements of Wildlife Management. One lecture. (1Sp) **Wolfe**

200. (99) Wildlife Practice. Integrated studies of wildlife populations in relation to land uses. (Summer Camp) **Helm**

300. (145) Principles of Wildlife Management. Application of ecological and sociological principles to the management of fish and game. (3W) **Stokes**

350. (154) General Fishery Biology. Life history, taxonomy, biology, and identification of the most common North American fishes; the phylogeny of fossil and modern fish. The biology discusses anatomy and physiology. Life histories are phylogenetic representatives of game and non-game fish. Present-day management practices and principles. (Independent Study only) **Sigler**

360. (173) Limnology. Introduction to the physical, chemical and biological factors operative in fresh and brackish water habitats. A study of man's use of and impact on aquatic systems. A generalized discussion of aquatic habitats as non-isolated ecosystems. (5F) **Koob**

361. (174) Limnology Laboratory. Field and laboratory techniques for determining community structure, metabolic parameters, and non-biotic factors of the aquatic habitat. Use of equipment and analysis of data will be stressed. (1F) **Koob**

384. (184) General Ecology. Interrelationships between plants and animals and their environments at the level of individual organisms; species populations, and ecosystems with emphasis on the structure and function of the latter two; human implications. Five lectures. (5F, Sp, Su) **Staff**

385. (185) General Ecology Laboratory. (Not required for credit in 384.) Field and lab study of populations and ecosystems, both terresterial and aquatic. One lab. (1F, Sp, Su) **Staff**

405. (172) Problem Orientation. A discussion of the needs of an approach to wildlife investigations, presenting data, analyzing the problem, and drawing conclusions relative to research in wildlife management. Three lectures. (3W) **Kelker**

410. (175) Wildlife Law Enforcement. Review of principles of state and federal regulations of fish and game; discussion of apprehension of violators, collection of evidence and its use in court. Three lectures. (3W) **Sigler**

415. (148) Animal Behavior. A general course in understanding of animal behavior with implications for human behavior. Suitable for non-biologists as well as biologists. Three lectures, one lab. (4F) **Stokes**

420. (150) General Wildlife Management. Life histories, economics, and management phases of important species of big game, upland game, waterfowl, and fish. Elective credit only for Wildlife majors. Five lectures; field trips arranged. (5F, Sp, Independent Study) **Kelker**

425. (155) Economic Wildlife. General importance of wildlife resources; natural history, economic values and control methods for rodents and predators; identification of skulls and skins; brief evaluation of hawks and reptiles. No credit for Wildlife majors. Two lectures, one lab. (3W) **Kelker**

430. (131) Management of Wildlife Habitat. Habitat requirements of game and methods of providing them. Prerequisite: Wildlife 300. Two lectures, one lab. (3F) **Spillett**

431. (132) Management of Wildlife Populations. Study of population characteristics of big game, waterfowl, upland game, and furbearers, and the implications of them to human exploitation, control of pest species, artificial propagation, and other management problems. Prerequisite: Wildlife 300. Three lectures and one lab, exercise indoors or in the field weekly. (4W) **Wolfe**

432. (133) Management Aspects of Wildlife Behavior. Behavioral principles important in the management of wildlife. Prerequisite: Wildlife 300. Two lectures, one lab. (3Sp) **Balph**

450. (167) Principles of Fish Culture. The principles of fish culture, fish hatchery management, diseases and nutrition of hatchery-reared fish. Three lectures. (3W) **Workman**

455. (159) Diseases of Fish. Methods of diagnosis and treatment. Two lectures. (2W) **Goede**

474. (168) World Fishery Resources. Development, economic significance, problems and application of research to management of selected commercial fisheries of the world. Three lectures. (3Sp) **Kramer**

490. (158) Wildlife Seminar. Discussion of conservation programs, employment opportunities, and new developments in research and management. (1W) **Low**

491. (170) Wildlife Problems. Individual study and research upon a selected wildlife problem. (1-5 F, W, Sp, Su) **Staff**

492. (210) Directed Reading. (1-5F, Sp, Su) **Staff**

495. (new) Undergraduate Research. Individual or team research on projects recognized by the CSC Undergraduate Research Subcommittee. (1-5F, W, Sp, Su) **Staff**

560. (162) Fishery Biology. Anatomy, development, respiration and excretion of fresh water teleosts. Two lectures, two labs. (4W) **Staff**

570. (169) Fishery Techniques. Techniques of life history study, fish sampling habitat management and fish stocking. Prerequisite: Wildlife 165. One eight-hour lab. (4F) **Helm**

571. (165) Fishery Principles. Principles of fish management in lakes and streams. Fish population structure and fish life history parameters. Prerequisite: Zoology 575. Three lectures, one lab. (4W) **Kramer, Stalnaker**

575. (new) Ichthyology (Zoology). Ecology, classification, and life histories of native and introduced fishes. Three lectures, two labs. (5W) **Sigler**

605. (248) Behavioral Ecology. Cause, function and development of behavior among animals. Prerequisite: Wildlife 415. Three lectures, one lab. (3W) **Balph**

620. (253) Advanced Big Game Management. Population dynamics, census methods, hunting regulations, and management plans. Prerequisite: Wildlife 384 or equivalent. Two lectures, one lab. (3W) **Wolfe**

630. (260) Ecology of Animal Populations. Growth, fluctuation, balance, and control of animal populations. Prerequisite: Wildlife 384 or equivalent. Four lectures. (4W) **Wagner**

650. (261) Pollution Biology. Biological and political concepts of water pollution. Effect of pollution and other environmental interactions on aquatic life. Writing and reviewing research proposals in aquatic ecology. Prerequisite: Wildlife 361 or equivalent. Four lectures. (4F) **Sigler**

680. (257) Graduate Seminar. Discussion of current investigation and management programs by class and staff members and by representatives of state and federal agencies. (F, W, Sp) **Helm, Spillett, Stalnaker**

681. (283) Seminar in Animal Behavior. Advanced readings, discussion, and critical analyses of current research in animal behavior and behavioral ecology. One class weekly. (1F, W) **Muller-Schwarze**

686. (281) Aquatic Environmental Interactions. Advanced readings analysis and discussion on effects of interacting physical, chemical and biological factors of the aquatic environment on aquatic animals. One class weekly. (1F, W, Sp) **Neuhold**

697. (270) Thesis Research. Credit for field or laboratory research. (1-15F, W, Sp, Su) **Staff**

698. (new) Research Consultation. Credit for library work and thesis writing. (1-5, F, W, Sp, Su) **Staff**

699. (400) Continuing Registration. (3F, W, Sp, Su) **Staff**

760. (262) Fish Population Theory. Study and discussion of the mathematical models which are in use in the field of fisheries. Four lectures, one discussion period. (5W) **Kramer**

782. (280) Seminar in Animal Populations. Advanced readings, discussions, and critical analysis of population dynamics, limiting mechanisms, and theories of population regulation in animals. One class weekly. (1F, W) **Wagner**

798. (new) Research Consultation. Library work and thesis writing. (1-5F, W, Sp, Su) **Staff**

797. (new) Dissertation Research. Field or laboratory research. (1-5 F, W, Sp, Su) **Staff**

799. (new) Continuing Registration. (3F, W, Sp, Su) **Staff**

*Department of

Zoology

Head: Professor Datus M. Hammond
Office in Forestry-Zoology 119

Professors Thomas L. Bahler, George E. Bohart, Donald W. Davis, Keith L. Dixon, Eldon J. Gardner, Raymond T. Sanders, William F. Sigler

Associate Professors James T. Bowman, William A. Brindley, LeGrande C. Ellis, Warren C. Foote, Merrill H. Gunnell, Wilford J. Hanson, Gene H. Linford, Reed S. Roberts, John R. Simmons, Hugh P. Stanley

Assistant Professors James A. Gessaman, Ting H. Hsiao, Emily C. Oaks

Collaborators Kenneth J. Capelle, Gerald D. Griffin, Jackson H. Judd, William P. Nye, Heber F. Thornley, Phillip F. Torchio

Degrees: Bachelor of Science (BS), Master of Science (MS), Doctor of Philosophy (PhD)

Majors: Zoology, Entomology, Physiology, Pre-Dental and Pre-Medical combined curriculum

The department includes Zoology proper, Entomology, and Physiology, plus pre-Medical and pre-Dental and Nursing programs.

Zoology, Physiology Programs. Majors in Zoology and Physiology obtain training in mathematics, physics, chemistry and botany, as well as zoology and physiology. The majority of positions open for persons with a BS degree in these subjects are in teaching. People with MS or PhD degrees are qualified for research and other positions in the federal government and in industry, as well as in university and college teaching.

Entomology Program. Majors in Entomology obtain training in zoology, botany, agriculture, and the physical sciences, depending on individual interests. There are career opportunities for entomologists with BS, MS, and PhD degrees. Entomologists with a BS degree are qualified for employment as representatives of insecticide companies, plant quarantine inspectors, and work in mosquito abatement, and forest insect control. Persons with MS or PhD degrees qualify for research and teaching positions.

Pre-Dental Program. The pre-Dental student may earn a BS degree before entering a dental school. However, he may enter a dental school after three years of pre-Dental work, in which case he may be graduated from USU by using his first year of dental school work to complete the USU graduation requirements.

Pre-Medical Program. The pre-Medical program satisfies entrance requirements of medical schools in the United States and Canada. After four years the student receives a BS degree with a Zoology or other major. Or he may, after completing three years here and one year at medical school, receive the BS degree from USU. During the past five years the acceptance rate of the pre-

*In College of Science.

Medical students in USU's program has averaged 65 percent.

Undergraduate Study

Major in Zoology. For this major the following courses are required: Biology 120, 121, 122, 512, 527, 584, and 585; at least two upper division Zoology courses (500 series) totaling 10 credits and one upper division (500 series) course (five credits) in Physiology including those offered in Entomology; Mathematics through two quarters of calculus (10 to 15 credits); Chemistry 121, 122, 123, 331, 332, and one additional upper division Chemistry course (26 credits); Physics 111, 112, and 113 or 221, 222, and 223. To be certified for graduation, a candidate must have a 2.2 average in these courses. For students intending to do graduate work, two years of a modern language are recommended.

Graduate Study

Master of Science Degree. The Zoology Department offers a Master of Science degree in various phases of agricultural entomology, genetics, medical entomology, systematic entomology, physiology, parasitology, mammalogy, ornithology, and herpetology.

Doctor of Philosophy Degree. Cooperatively with related departments, advanced study and research is offered for the attainment of the degree of Doctor of Philosophy in specialized fields of Zoology, Entomology, and Physiology. Further information may be obtained from the department or from the dean of the School of Graduate Studies.

Zoology Courses

For additional courses in Biology see the Division of Biology.

Undergraduate

160. (16) General Zoology. Study of the animal kingdom, with emphasis on comparative structure and function of the organ systems and on evolutionary relationships. Prerequisite: At least one course in biology. Three lectures, two labs. (5F, W, Sp) **Staff**

251. (31) Evolution. A general consideration of the biological principles of evolution as they apply to plants, animals and man. Prerequisite: Life Sciences 101 or a good high school course in biology. Three lectures. (3W) **Gunnell**

365. (123) Field Zoology. Study of the most common Utah animals, including identification, natural history, distribution, ecology, etc. Collection and preparation of specimens for study, display, and storage. Prerequisite: Zool 160 or Biol 120, 121, and 122. Two lectures, two labs. (4F) **Linford**

Principles of Genetics. See Biol 512.

Cytology. See Biol 527.

551. (101) Invertebrate Zoology. The more important phyla of invertebrates, with some consideration of local fauna. Prerequisite: Zool 100 or Biol 120, 121 and 122. Three lectures, two labs. (5Sp) **Staff**

553. (107) History and Literature of Biology. The more important men and ideas in the historical development of biology. (4F) **Gardner**

555. (116) Parasitology. Protozoa and worms parasitic in man, domestic animals, and wild animals, and relationships between parasites and their hosts. Prerequisite: Zool 160 or Biol 120, 121, and 122. Three lectures, two labs. (5Sp) **Bahler, Hammond**

557. (118) Principles of Development. An introduction to the principles of development of the vertebrates. Prerequisite: Zool 160 or Biol 120, 121, and 122. Three lectures, two labs. (5Sp) **Stanley**

559. (119) Comparative Anatomy. Fundamentals of the main types of vertebrates. Prerequisite: Zool 160 or Biol 120, 121, and 122. Three lectures, two labs. (5W) **Dixon**

561. (121) Ornithology. Structures, classification, distribution and annual cycles of birds, with emphasis on study of local fauna in the field. Prerequisite: Zool 160 or Biol 120, 121, and 122. Two lectures, two labs. (4Sp) **Dixon**

563. (122) Mammalogy. Structure, classification, life histories, and distribution of mammals; introduction to methods of field investigation. Prerequisite: Zool 160 or Biol 120, 121, and 122. Two lectures, two labs. (4F) **Oaks**

567. (128) Elements of Histology. Study of tissues, including characteristics of different kinds of tissues and the main organs. Prerequisite: Zool 160 or Biol 120, 121, and 122. Four lectures, one lab. (5F) **Bahler**

569. (129) Histological Technique. Techniques employed in making preparations of animal tissues for microscopic study. Three labs. (3Sp) **Staff**

°**571. (132) Mechanics of Evolution.** Critical study of the facts and theories pertaining to the biological principles of evolution, with emphasis on how it occurs, including some consideration of population genetics. Prerequisites: Zool 160 and Biol 512 or Bot 140 or equivalents. Five lectures. (5Sp) **Bowman**

573. (150) Herpetology. Classification, distribution, life habits, and identification of amphibians and reptiles, with emphasis on local forms. Prerequisite: Zool 160 or Biol 160 or Biol 120, 121, and 122. Two lectures, two labs. (4Sp) **Gunnell**

575. (155) Ichthyology. Ecology, classification, and life histories of native and introduced fishes. Three lectures, two labs. (5W) **Sigler**

577. (101) Principles of Animal Taxonomy. A study of the principles of classifications of animals and the rules of zoological nomenclature. Prerequisite: Entomology 530 or Zool 160 or Biol 120, 121, and 122. Two lectures. (2W) **Oaks**

Graduate

651. (205) Orientation for Graduate Students. Introduction to procedures in graduate study; qualifying examination, scientific method, selection of problem, becoming acquainted with literature, organization and writing of thesis and final examination. Required of all graduate students in Zoology, Entomology, Physiology. (1W) **Staff**

653. (207) Theoretical Biology. A critical study of modern biological thought. (3F) **Sanders**

Genetics of Lower Organisms. See Bacteriology 655.

°**657. (212) Biochemical Genetics.** Concepts of genetic function at the chemical and molecular level, with emphasis on current literature. Prerequisites: Biol 512, Chemistry 333. Recommended Chemistry 670. Three lectures. (3Sp) **Simmons**

°°**659. (214) Current Topics in Genetics.** Prerequisite: Biol 512. May be repeated for credit with instructor's consent. (3W) **Bowman**

°**661. (215) Genetics of Drosophila and Maize.** Concepts of genetic structure, function, and recombination in higher organisms, with emphasis on current literature. Prerequisite: Biol 512. Three lectures. (3W) **Bowman**

663. (224) Biological Electron Microscopy. Theory and practice of techniques for the preparation of biological materials for study with the electron microscope. One lecture, two labs. (3W) **Stanley**

°**665. (225) Current Topics in Developmental Biology.** A consideration of selected problems in morphogenesis and other aspects of developmental biology. Prerequisite: Zool 557. Three lectures. (3Sp) **Stanley**

667. (233) Zoogeography. Principles governing the distribution of animals, with emphasis on terrestrial vertebrates, and the history of the biota of western North America from the beginning of the Cenozoic era. (3W) **Dixon**

669. (235) Protozoology. Protozoa, with emphasis on parasitic forms, and on the methods of studying protozoa. Consideration is also given to free-living protozoa and to classification, morphology, physiology, and reproduction of protozoa in general. Prerequisite: Zool 555. Two lectures, two labs. (4W) **Hammond**

671. (236) Advanced Parasitology. Detailed study of certain parasitic protozoa and helminths. Prerequisite: Zool 669. (2Sp) **Hammond**

681. (261) Seminar in Vertebrate Zoology. (1F, 1W) **Dixon, Oaks**

682. (271) Seminar in Genetics. (1F, 1W, 1Sp) **Bowman, Gardner, Simmons**

683. (281) Seminar in Parasitology. (1F, 1W, 1Sp) **Hammond**

684. (291) Seminar in Developmental Biology. (1F, 1W, 1Sp) **Stanley**

691. (201) Special Problems. Individual study of a problem under the guidance of a staff member. Credit arranged. (F, W, Sp) **Staff**

697. (new) Thesis Research. Credit arranged. (F, W, Sp) **Staff**

698. (new) Research Consultation. Credit arranged. (F, W, Sp) **Staff**

699. (400) Continuing Registration. Credit arranged. (F, W, Sp) **Staff**

797. (new) Dissertation Research. Credit arranged. (F, W, Sp) **Staff**

798. (new) Research Consultation. Credit arranged. (F, W, Sp) **Staff**

799. (new) Continuing Registration. Credit arranged. (F, W, Sp) **Staff**

Entomology

Students preparing for graduate work in Entomology should fulfill

the requirements for a Zoology major. The Applied Entomology undergraduate major prepares students for employment in industry as well as federal and state agencies. The following courses are required for this major: Biology 120, 121, 122, 512, 584 and 585; Entomology 530, 531, 532, 533, 535, and 539; Botany 420 and 550 or 551; Plant Science 565; Chemistry through Organic; Mathematics through algebra; Applied Statistics, at least one course; Physics 120.

Entomology Courses

Undergraduate

129. (13) General Entomology. An introductory course emphasizing insect biology. Serves as a course for non-majors and/or as a prerequisite for more advanced entomology studies. Prerequisite: A course in biology. Three lectures, two labs. (5Sp) **Roberts**

530. (100) Systematic Entomology. Classification of insects with emphasis at family level. Extensive insect collection required. Prerequisite: Entom 129 or equivalent. One lecture, two labs. (3F) **Hanson**

531. (111) Principles of Entomology. Morphology and function of external insect structures. Prerequisite: Basic Entomology or instructor's consent. Two lectures, one lab. (3F) **Staff**

532. (112) Principles of Entomology. Function and structure of internal systems of insects. Prerequisite: Entom 531 or instructor's consent. Three lectures, two labs. (5W) **Brindley**

533. (113) Principles of Entomology. Adaptive mechanisms in insects; sensory reception, orientation, organization, communication, food relations, defense and offense, diurnal rhythms and life cycles, and related topics. Prerequisite: Basic Entomology, Entom 532. Three lectures, two labs. (5Sp) **Hsiao**

534. (105) Forest Entomology. Ecology, life history, identification, and control of major forest insects, both beneficial and harmful. Prerequisite: Entom 129 or equivalent. Two lectures, one lab. (3F, given when there is sufficient demand) **Davis**

535. (115) Medical and Veterinary Entomology. A study of arthropods that annoy and transmit agents of disease to man and domesticated animals. Prerequisite: Zool 160 or Biol 120, 121, 122. Two lectures, two labs. (4W) **Hanson**

****536. (120) Insect Pollination in Relation to Agriculture.** Includes beekeeping as related to crop pollination, utilization of native pollinating insects, and special problems in the pollination of many commercial crops. (2W) **Bohart**

537. (138) Aquatic Entomology. Identification, distribution, life histories and adaptations of aquatic insects, with particular reference to local habitats. Prerequisite: Basic Entomology or instructor's consent. Two lectures, one lab. (3Sp) **Hanson**

***538. (130) Nematology.** Recognition, distribution, host and environmental relations, and control of nematodes with emphasis on plant parasitic forms. Prerequisite: Zool 160 or Biol 120, 121, 122. (3W) **Staff**

539. (108) Economic Entomology. Insects as related to the economic pursuits of man. Includes recognition, type of damage or benefits, life histories, and control. Prerequisite: A course in biology. Three lectures, two labs. (5F) **Davis**

565. (new) Agricultural Sprays and Dusts. See Plant Science 565.

Graduate

***630 (202) Advanced Systematic Entomology.** Taxonomic studies on specific groups of insects, including preparation of keys, description of species and scientific illustration. Prerequisites: Entom 530, Zool 577. May be taken concurrently with Zool 577. One lecture, one lab. (2W) **Hanson**

***631. (206) Insect Ecology.** Influence of environment on insect development, behavior distribution, and abundance. May be taken with or without Entom 632. Prerequisites: Biol 584, 585. (3W) **Hsiao**

***632. (207) Insect Ecology Laboratory.** Prerequisite: Current registration or prior completion of Entom 631. (2W) **Hsiao**

****633. (212) Insect Physiology.** The biochemical basis of life processes in insects; nutrition, digestion, excretion, intermediate metabolism, respiration, neuro-muscular interaction, neuro-endocrine control of growth and development. Prerequisites: Entom 532 or Physiology 603, and Biochemistry, or equivalents. Three lectures, two labs. (5F) **Hsiao**

****635. (213) Insecticide Toxicology.** An introduction to the principles of toxicology as applied to the control of insects: includes

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*Taught 1971-72.
**Taught 1972-73.

molecular structure of insecticides as related to toxicity, mode of action of insecticides, and problems of residues. Prerequisites: Entom 532 or Physiology 603, and Organic Chemistry or Biochemistry, or equivalents. Three lectures. (3Sp) **Brindley**

636. (213) Insecticide Toxiocology Laboratory. Prerequisite: Current registration or prior completion of Entom 635. (2Sp) **Brindley**

*637. (231) **Biological Control of Insect Pests.** Study of invertebrate parasites and predators of insects. Consideration is also given to diseases of insects, vertebrate predators, and destruction of undesirable plants by insects. Prerequisite: Entom 129 or 539. Two lectures, one lab. (3W) **Davis**

685. (261) Seminar in Entomology. (1F, 1W, 1Sp) **Staff**

692. (210) Special Problems. Individual study under staff guidance. Prerequisite: Instructor's consent. Credit arranged. (F, W, Sp)

697. (250) Thesis Research. Credit arranged. (F, W, Sp) **Staff**

698. (400) Research Consultation. Credit arranged. (F, W, Sp) **Staff**

699. (400) Continuing Registration. Credit arranged. (F, W, Sp) **Staff**

797. (new) Dissertation Research. Credit arranged. (F, W, Sp) **Staff**

798. (new) Research Consultation. Credit arranged. (F, W, Sp) **Staff**

799. (new) Continuing Registration. Credit arranged. (F, W, Sp) **Staff**

Physiology

To prepare for graduate work in Physiology it is recommended that the requirements for a Zoology major be completed.

Physiology Courses

Undergraduate

103. (20) Human Anatomy. Structure of the main human body systems with emphasis on the muscular, skeletal, and nervous systems. For students desiring a more thorough study of human anatomy than is given in Physiology 130. Prerequisite: Physiol 130. Two lectures, one lab. (3F, W) **Linford**

130. (4) Human Physiology. Functioning of the human body, with emphasis upon broad general biological principles. Five lectures, one lab. (5F, W, Sp) **Bahler**

301. (104) Advanced Human Physiology. A survey of the systems of man with emphasis on the function of the circulatory, nervous, and muscular systems. Designed primarily for students with teaching majors in the biological sciences. Prerequisites: Physiol 130, Zool 160, or Biol 120, 121, 122, Chem 141. Three lectures, two labs. (5Sp) **Staff**

501, 502. (121, 122) Mammalian Physiology. An intensive and detailed two-quarter course in physiology in which the functions of each of the organ systems of man and animals is studied. Students may not register for 502 without having had Physiol 501. As preparation, Zool 160 or Biol 120, 121, 122, Chem 121, 122, 123, 331, 332, 333, or equivalent, and a course in Physics are required. Three lectures, two labs. (5W) **Ellis, Gessaman**

503. (141) Endocrinology. Ductless glands and their secretions. Emphasis is placed on the action of these hormones on growth, metabolism, and adaptation of animals to changes in the internal and external environments. Prerequisites: Zool 160 or Biol 120, 121, 122, Physiol 130, and Chem 331, 332. Three lectures, one lab. (4Sp) **Ellis**

603. (151) Comparative Physiology. A comparative study of organ function in the animal kingdom. Prerequisite: Biol 527. Three lectures, two labs. (5Sp) **Sanders**

601. (130) Cellular Physiology. Prerequisites: Chem 331 and 332 and Physics 111, 112, and 113 or equivalent. Three lectures, two labs. (5W) **Sanders**

605. (253) Ecological Vertebrate Physiology. Physiological responses and adaptations of vertebrates to the geophysical, geochemical, and biological environment. Bioenergetics at the species and community level. Prerequisite: One course in Ecology and one course in Physiology. Three lectures, two labs. (5F) **Gessaman**

*620. (242) **Advanced Reproductive Physiology.** Processes of reproduction in mammals including mechanisms of control. Prerequisites: Physiol 502, 503, Zool 557 or equivalent and a course in Organic Chemistry. Three lectures, one lab. (4W) **Call, Ellis, Foote**

686. (281) Seminar in Physiology. Required of all Physiology graduate students each Fall, Winter and Spring Quarters while in residence. Seniors in Physiology and others may enroll with instructors's consent. (1F, 1W, 1Sp) **Staff**

693. (201) Special Problems. Individual study under staff guidance. Prerequisite: Instructor's consent. Credit arranged. (F, W, Sp)

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*Taught 1971-72.
**Taught 1972-73.

*694. (261) **Physiology of Response.** A detailed physiological study of neuromuscular mechanisms of response in the animal kingdom. Prerequisites: Physiol 502 or 601, Chem 670, Physics 213 or equivalents. Two lectures, one lab. (3F) **Staff**

695. (271) **Readings in Physiology.** Reading and reporting of classical and current literature in Physiology. Required of all Physiology graduate students each quarter while in residence. Seniors in Physiology and others may enroll with the instructor's consent. (1F, 1W, 1Sp) **Staff**

697. (new) **Thesis Research.** Credit arranged. (F, W, Sp) **Staff**

698. (new) **Research Consultation.** Credit arranged. (F, W, Sp) **Staff**

699. (new) **Continuing Registration.** Credit arranged. (F, W, Sp) **Staff**

797. (new) **Dissertation Research.** Credit arranged. (F, W, Sp) **Staff**

798. (new) **Research Consultation.** Credit arranged. (F, W, Sp) **Staff**

799. (new) **Continuing Registration.** Credit arranged. (F, W, Sp) **Staff**

Pre-Dentistry

Students planning to enter dentistry may take the necessary courses in the College of Science to satisfy requirements for admission to any school of dentistry in the United States.
Suggested pre-Dental schedule:

FRESHMAN YEAR

Courses	Credits F	W	Sp
Chemistry 121, 122, 123	5	5	5
Math 101, 105, 106	3	5	3
English 101, 102, 103	3	3	3
MS, AS[1], or PE	1	1	1
Electives (optional)	3	2	5
Totals	15	16	17

SOPHOMORE YEAR

	F	W	Sp
Biology 120 121, 122	5	5	5
Physics 111, 112, 113	5	5	5
Electives (optional)	7	7	7
Totals	17	17	17

*Taught 1971-72.

JUNIOR YEAR[2]

	F	W	Sp
Chemistry 331, 332, 333	4	4	3
Zoology 557 or 559		5	or 5
Electives	13	8	9
Totals	17	17	17

Pre-Medicine

The College of Science offers the courses to provide a pre-Medical training that satisfies entrance requirements of medical schools in the United States and Canada.
Suggested pre-Medical schedule:

FRESHMAN YEAR

Courses	Credits F	W	Sp
English 101, 102, 103	3	3	3
Biology 120, 121, 122	5	5	5
Math 105, 220, 221	5	5	5
AS, MS or PE	1	1	1
Electives	3	3	3
Totals	17	17	17

SOPHOMORE YEAR

	F	W	Sp
Chemistry 121, 122, 123	5	5	5
Physics 111, 112, 113	5	5	5
Physics 221, 222, 223			
Electives	8	8	8
Totals	18	18	18

JUNIOR YEAR

	F	W	Sp
Chemistry 331, 332, 333	4	4	3
Biology 512		5	
Zoology 557			5
Electives	14	9	10
Totals	18	18	18

[1]Military Science or Aerospace Studies would be two credits each quarter.

[2]Students with unusually good records are sometimes accepted after two years of predental work. In this case the required courses included in the three-year program listed above must be completed in two years.

Recommended electives are Psychology, History, Philosophy, Political Science, Sociology, Economics, Vocabulary, and other English courses.

Students planning to receive a BS degree in a combined curriculum (three years at USU and one year in dental school) must complete a minimum of 141 credits of pre-professional work, including the USU graduation requirements.

SENIOR YEAR

	F	W	Sp
Biology 527		5	
Biology 584			5
Biology 585			1
Physiology 505			5
Two additional courses from the Zoology 500 series	5	5	
Electives	10	5	5
Totals	15	15	15

Electives should be chosen from the Humanities, Arts, and Social Sciences.

Students interested in graduation from USU before attending medical school may major in any subject.

If interested in a pre-osteopathic program, students should consult the pre-medical adviser.

If planning to receive a BS degree in a combined curriculum (three years at USU and one year in a medical school), students must fulfill requirements of USU and must complete a minimum of 141 credits of pre-professional work.

NURSING PROGRAM

Cooperative Associate Degree Nursing Program, Weber State College—Utah State University

Weber State College in cooperation with Utah State University has extended the Associate Degree in Nursing Program to the Cache Valley area. Twenty students will be admitted to the two-year program each year, and priority will be given to residents of the Cache Valley area, with second priority extended to state residents outside that area.

Students will take the general educational requirements at Utah State University and most of the clincial experience will be in the Logan LDS Hospital. Students will register for nursing courses at the Weber State College and will graduate from Weber State College with an Associate Degree in Nursing. Graduates will be eligible to write the State Board Test Pool licensing examination for the Registered Nurse license.

The program is accredited by the Utah Board of Nursing and the National League of Nursing.

Students may apply to the Director of Nursing at Weber State College, or may contact the Dean, College of Science, Utah State University for additional information concerning the program.

SCHOOL OF GRADUATE STUDIES

School of

Graduate Studies

Dean Eldon J. Gardner
Office in Main 130

Graduate study is supervised by the dean of the School of Graduate Studies. Policy is determined by the Graduate Council. This council includes one representative from each of the eight resident colleges of the University. The librarian is an ex-officio member. College representatives on the council are nominated by the college, approved by the Faculty Senate, and appointed by the president to serve four-year terms, two to be appointed each year.

The present Graduate Council is listed below with the year in which each member's term of office expires: College of Agriculture, Joseph C. Street, 1973; College of Business, Leonard J. Arrington, 1973; College of Education, Jay R. Jensen, 1973; College of Engineering, Bruce O. Watkins, 1973; College of Family Life, Jay D. Schvaneveldt, 1972; College of Humanities, Arts and Social Sciences, JeDon Emenhiser, 1972; College of Natural Resources, David Goodall, 1974; College of Science, Keith L. Dixon, 1971.

Graduate Degrees

Graduate degrees offered at Utah State University include: Master of Engineering Science, Master of Forestry, Master of Music, Master of Science, Master of Business Administration, Master of Industrial Education, Master of Arts, Master of Fine Arts, Master of Landscape Architecture, Master of Mathematics, Doctor of Education, and Doctor of Philosophy.

A graduate with a bachelor's degree from USU or from any other accredited college or university may be admitted to the School of Graduate Studies if: 1) recommendations by a department for an advanced degree program are received, and 2) requirements of the School of Graduate Studies are fulfilled. A 2.75 grade point average in the most recent two years (or 90 credits) of academic work is necessary for admission to the School of Graduate Studies. Seniors at USU who have an average of 2.75 or better in their courses in the Junior and Senior years, and who at the beginning of any quarter lack not more than six credits to complete all requirements for the bachelor's degree, may be allowed to register in the School of Graduate Studies at the same time they are completing their undergraduate requirements. A form for a split program may be obtained from the School of Graduate Studies.

An application for admission accompanied by official transcripts of all previously earned college credits, verification of a bachelor's degree, the results of the aptitude section of the Graduate Record Exam (or the Aptitude Test for Graduate Study in Business if the student is applying as an MBA candidate), and three letters of recommendation should be presented to the School of Graduate Studies at least 60 days

in advance of the day of registration. Students from foreign countries must present an English translation of credentials. The student's file will then be submitted to the appropriate department for approval. Applications will not be considered for the current quarter when submitted the week of registration.

If the student cannot qualify for an advanced degree program in a particular field, he may be admitted to the University as a non-matriculated graduate student. He may register as non-matriculated as long as he desires, but only 18 credits can be transferred to an advanced degree program. When the requirements of a department to enter an advanced degree program and the scholastic requirements of the Graduate School are met, he may be matriculated for a degree program in the School of Graduate Studies.

General Policies on

Graduate Work

Qualifying Examinations. Any qualifying examination required by the major department, in addition to the aptitude section of the Graduate Record Exam, must be taken as soon as possible after registration. The results of these examinations become a part of the student's file in the Graduate Office. If found to be deficient in the work basic to the proposed field of study, undergraduate courses, which do not count in the minimum requirements for the advanced degree, may be required.

Supervisory Committee. When it has been determined that a student is acceptable as a possible candidate for a higher degree, the department head will suggest a committee to assist in guiding the program and in conducting necessary additional qualifying examinations and the final examination. When the program has been determined, candidacy forms should be completed and approved by the committee and submitted to the School of Graduate Studies for the dean's approval. This should be done during the second quarter of the program. Advancement to candidacy must be accomplished by February 15 for graduation at the following commencement. When research is best supervised by a federal collaborator, or other person who is not a member of the regular teaching staff, such collaborator or other person may be designated as thesis director. This thesis director is a member of the student's committee.

Thesis or Dissertation. A candidate for most advanced degree programs must present a thesis or dissertation on a topic within the field of his major subject, which may represent as much as fifteen credits presented for the master's degree. The thesis or dissertation must be a contribution to the field of knowledge, based upon the student's own research or a treatment and presentation of known subject matter from a new point of view. When approved by the major professor, a copy must be submitted to each member of the student's supervisory committee at least two weeks before the date of final examination. At least two-thirds of the committee members should sign the thesis or dissertation. When the thesis is approved by the committee and the candidate has successfully passed the final examination, the thesis or dissertation should be typed in final form (usually on mats) and presented to the editor for checking. Final approval is given by the dean of the School of Graduate

Studies. Four printed copies of the thesis are then submitted for binding. Two of these copies will be deposited in the library, another sent to the department, and the fourth returned to the student.

Microfilming of Thesis. A doctoral candidate pays a fee of $20 to have his dissertation microfilmed. This film is produced by and registered with University Microfilms, Ann Arbor, Michigan, which also publishes an abstract.

Thesis Alternate. The supervisory committee may permit the substitution of one or two advanced reports, valued at three to ten credits for the regular master's thesis. These are known as "Plan B" reports. The master's program is otherwise the same under Plan B. In certain specialized programs, no thesis or Plan B papers are required.

Credit Load. Twelve credits per quarter is considered a full load for fulfilling residence requirements. Recommended maximum load for full-time graduate students is 16 credits. The maximum for teaching assistants is 12 credits.

Final Examination. A candidate for the master's degree is required to pass a comprehensive final examination on the subject of graduate study and on his thesis, if one is part of his program. This examination may be oral or written or both as the committee decides, and is open to all faculty members and officials of the School of Graduate Studies.

Arrangements for the time and place of the examination are made by the supervisory committee. A member of this committee, other than the major professor, or other representative of the Graduate Council, is appointed to act as chairman of the examination and submits to the Graduate Office the results of the examination. If a student is to receive his degree at the June commencement, the date of the final examination should not be later than April 15.

Time Limit. Work for a graduate degree must be completed within six years from the date of matriculation as a regular student in the School of Graduate Studies. Older work may be revalidated by examination or additional course work. Statements signed by the student's committee and department head specifying action taken on particular outdated courses must be submitted to the Graduate Office for approval before such courses can be used to fulfill the requirements for a degree.

Extension Course Credit. The amount of extension class or other off-campus credit to be allowed will be determined in consideration of the entire course program. The total of all off-campus credit may not exceed 18 credits, exclusive of thesis. All extension courses for which graduate credit is sought must be regularly registered for through the School of Graduate Studies and must have the sanction of the head of the department in which graduate work is being done. Credit toward a graduate degree is not granted for correspondence courses (Independent Study).

Transfer Credit. A maximum of nine credits of graduate work satisfactorily completed at another approved graduate school may be allowed toward a master's degree.

Degrees of

Master of Arts, Science

The Master of Arts and the Master of Science degrees are offered in most of the basic biological, physical, and social sciences

and in various educational, industrial, and professional divisions of the University. Specific departments in which the master's degree is given, together with the courses provided by the departments, may be determined by consulting the departmental statements in this catalog or the Graduate Catalog.

Requirements. The program for the master's degree must include: 1) at least 27 residence credits exclusive of thesis; 18 credits taken at off-campus residence centers may count toward this requirement; 2) at least 45 credits in courses approved by the department or supervisory committee for graduate credit; 3) a thesis or thesis alternate; 4) for the Master of Arts degree, two years of a foreign language, or equivalent proficiency in such a language as proved by testing.

Degree of

Master of Business Administration

The Master of Business Administration degree is given upon completion of a course of study prescribed by the Department of Business Administration within the general requirements of the School of Graduate Studies. It is designed to serve the needs of graduates from recognized colleges of Business as well as graduates in Liberal Arts, Science, Engineering or other fields with a professional interest in management. The entire program, aimed at developing broad executive skills, can be covered in a period of two years. Those with strong backgrounds in Business Administration and Economics, however, should be able to complete the program in a significantly shorter time.

Degree of

Master of Education

A course of study leading to the Master of Education degree is offered with various specialty options. The course of study leading to the Master of Education degree in each area has for its purpose the preparation of thoroughly prepared teachers, supervisors, and administrators. It provides a broad foundation in the field of education and in the particular area of specialization, and differs from the Master of Science degree by providing more flexible requirements to meet specific needs. This degree emphasizes a proficiency in the interpretation and application of research.

The requirements for the Master of Education degree include: 1) at least 48 credits beyond the Bachelor's degree, subject to the same limitations of off-campus course credit, transfer credit and time limit as the Master of Science degree; 2) general culture courses in the Humanities, Sciences, and Social Sciences; 3) specified courses in each of seven areas of the field of Education; 4) possession of a teaching, administrative, supervisory or other appropriate state school certificate; 5) evidence of potential success as a teacher or sucessful teaching experience.

Degree of

Master of Fine Arts

This is a specialized professional degree. In 1959 the College Art Association of America approved the MFA, rather than the PhD, as the terminal degree in the Studio Arts. Whereas an Exceptional student devoting full time might qualify after four quarters, it is generally considered to require an

average of two years to produce enough art works of sufficient quality to be recommended for this degree. The emphasis is on the productive demonstration of high artistic and technical achievement by students with considerable creative abilities. Only students whose previous art works indicate a promising potential in Art will be accepted for admission to the MFA program.

Because this degree is highly individualized, the student should consult the department or his graduate committee for more detailed information on requirements.

Degree of

Master of Forestry

The Master of Forestry degree is given upon completion of a course of study prescribed by the Department of Forest Science within the general requirements of the School of Graduate Studies. It is designed for those who have a bachelor's degree in some field other than Forestry and who wish to earn a degree in Forestry. It normally requires from two to three years, depending upon how closely the original field is related to Forestry.

Degree of

Master of Industrial Education

The Master of Industrial Education degree provides advanced preparation for those engaged in teaching, supervising or administering Industrial Education programs. This program is sufficiently flexible to meet the needs of individuals engaged in the various phases of the work. It is planned to provide the cultural and professional development considered essential to educational leadership in this field. The requirements are essentially the same as for the Master of Science degree except that additional professional course work is taken in lieu of the traditional master's thesis requirement. The candidate must complete a scholarly piece of work designated as a "Master's Paper." This report should demonstrate the student's competence in professional writing. The degree is awarded only when the candidate's overall record, including course work, the Master's examinations, and the Master's Paper, represent creditable accomplishment. Candidates for this degree should have had successful industrial, supervisory, administrative, or teaching experience.

Degree of

Master of Landscape Architecture

Requirements for this degree include:

1) The MLA degree is the professional terminal degree in Landscape Architecture and Environmental Planning as established by the American Society of Landscape Architects. It constitutes a one-and-a-half to two-year program.

2) Holders of bachelor's degrees in allied fields may become candidates for the MLA if they satisfactorily complete, or have completed a minimum of 45 credits in Landscape Architecture at the upper division level.

3) A thesis of 10 to 15 credits is required, the precise number of credits determined jointly by the candidate and faculty, depending upon the complexity and scope of the chosen subject.

4) The level at which students enter into the graduate program will be determined by an evaluation of their past background and experience.

5) Certain upper division and graduate courses will be required in allied fields, particularly if the candidate chooses to take a Master of Science in Environmental Planning, which encompasses a broader approach to design problems, rather than the MLA.

Degree of

Master of Mathematics

The Master of Mathematics (M M) degree is primarily intended for college teachers of mathematics, but is also appropriate for secondary school teachers.

Requirements for the degree are: 1) 48 credits of approved course work beyond the bachelor's degree of which 15 credits can be in areas other than Mathematics; 2) completion of an academic year of study of Advanced Calculus and Modern Algebra; 3) passing a final oral examination (no thesis is required.)

Degree of

Master of Music

The Master of Music degree offers advanced specialized training both in musical performance and in the teaching of music. It is attained through completion of a course of study which is planned to increase the candidate's understanding of the art of performance and the art of successful music teaching. Candidates for this degree must show evidence of being either unusually gifted performers or competent teacher-performers of music. Students may elect a recital or a thesis project. If the thesis project is elected in lieu of the recital it must deal with some aspect of music teaching and make a significant contribution to the improvement of the creative teaching process. The student may select a course of study leading to a major in Music Education or a major in Applied Music.

Each candidate must successfully complete an examination for admission to the program of graduate study in Music. This examination may be taken under the supervision of a proctor at a college or school designated by the University Department of Music and near the candidate's place of residence.

Specialist in

Educational Administration (Six-Year Program)

A six-year program in the College of Education terminates in the Specialist in Educational Administration. Requirements include: 1) a master's degree or equivalent; 2) a total of 45 credits—27 on the Logan campus, of which 15 credits must be taken in one quarter; 3) at least 12 credits in Secondary Education for candidates with previous preparation in Elementary Education and a minimum of 12 credits in Elementary Education for those previously prepared in Secondary Education; 4) written comprehensive examination covering the work taken; 5) qualifications for either Utah State Department of Public Instruction General Administration Certificate or equivalent approved certificate.

Degree of

Doctor of Education

The degree of Doctor of Education is designed especially to pre-

pare for leadership and expert service in the field of Education. Requirements for this degree include the development of competence in an area of specialization in Education plus a thorough development of skills and knowledge of the broad field of Education and in a field supplementary to professional education.

The minimum requirements for the Doctor of Education degree are: 1) a master's degree or equivalent; 2) a program of at least 90 credits of approved graduate study beyond the master's degree; 3) an acceptable dissertation for which a maximum of 18 credits may be given; 4) four quarters of residence at USU, three of which must be in consecutive sequence (minimum of 12 credits per quarter.)

Detailed requirements for the above degrees may be obtained at the office of either the dean of the School of Graduate Studies or the dean of the College of Education or the head of the department in which the degree is to be taken.

Degree of

Doctor of Philosophy

The degree of Doctor of Philosophy (PhD) is awarded by USU in recognition of high attainment and productive scholarship in a specific field of learning.

Majors Offered. The doctor of Philosophy degree is offered in: Agricultural and Irrigation Engineering, Animal Science, Bacteriology, Biochemistry, Botany, Chemistry, Civil Engineering, Ecology, Economics, Electrical Engineering, Nutrition, Food Science and Technology, Forest Science, Mechanical Engineering, Physics, Plant Science, Sociology, Soils and Meteorology, Toxicology, Wildlife Resources, Zoology.

Admission to the School of Graduate Studies to work toward the degree of Doctor of Philosophy is obtained in the same manner as for the master's degree. Qualifying examinations are similarly required, and the program is likewise directed by a supervisory committee.

Requirements. The PhD degree is not awarded for just the fulfillment of a residence requirement and a fixed number of credits. It represents high-quality achievement demonstrated by independent research on which a dissertation is presented and by competence in a particular subject area. Three or more years of approved graduate study are required to complete the PhD degree. One of the last two years must be spent in continuous residence at USU. Although competence in the field as determined by examination and productivity in research as represented by the dissertation are major criteria for accomplishment in a PhD program, it is expected that the candidate will present approximately 135 credits of approved high-quality graduate study above the bachelor's degree or approximately 90 credits above the master's degree.

Language Requirement. A reading knowledge of at least one modern language other than English is required in the PhD programs. Normally one of the languages of global scientific or scholarly communication—French, German, Russian, Spanish, English (for students whose native tongue is not English) — will be selected according to the candidate's particular need. The requirement for a second modern language or an alternative to the language requirement is optional with certain departments in which the major is taken.

Testing and certification of language proficiency will be performed by the faculty of the Department of Languages on the basis of courses completed and/or performance in language proficiency exams offered to eligible applicants semiannually (in November and April). The required language proficiency should be demonstrated before the beginning of the third year of graduate work.

Comprehensive Examination and Candidacy. Written and oral examinations are conducted by the supervisory committee usually in the last quarter of the second year of work, to determine fitness for admission to candidacy for the degree of Doctor of Philosophy.

Dissertation. A completed dissertation approved by the major professor must be presented to the supervisory committee at least eight weeks before the student would graduate. The dissertation must show ability to do critical independent research. It must present a contribution to knowledge in scholarly fashion.

Final Examination. The final examination in defense of dissertation will be conducted by the supervisory committee at least six weeks before the student is to receive his diploma.

Teaching and Research Assistantships

A number of teaching and research assistantships in various departments of the University are available each year to graduate students. Teaching assistantships carry a stipend of $1,200 to $3,600 and waiver of the non-resident tuition fee for one-fourth to one-half time teaching service on a nine-month basis. Remuneration for research assistantships may vary from $1,200 to $4,500 depending upon the service involved. Generally assistantships are arranged so that the student may complete the master's degree in two years.

Assistantships are normally available in each of the departments offering graduate degrees. Applications should be directed to these departments.

Fellowships

University Research Fellowships carry a stipend of $3,500 and the remission of non-resident tuition. The student is required to participate successfully in a research project leading to a master's thesis or doctor's dissertation. These are tenable in any field in which USU grants an advanced degree. Applications must be made by February 15, and awards are made on April 1.

Traineeships. The University has certain traineeship doctoral programs supported by the National Institutes of Health and the National Science Foundation. The basic stipend is $600 per quarter, with tuition and fees paid, and with additional allowances for dependents and progression.

NDEA Fellowships. These fellowships are available at USU in Bacteriology, Botany, Chemistry, Civil Engineering, Ecology, Education, Electrical Engineering, Industrial and Technical Education, Mechanical Engineering, Physics, Plant Science, Soils and Meteorology, Wildlife Resources, and Zoology. They are for students who wish to become college and university teachers, and who will undertake a doctoral program. Basic stipend is $600 per quarter with additional for dependents and progression and with tuition and fees paid.

Other Fellowships. The University also participates in the Graduate Fellowship Program of the National Science Foundation, and in the Fellowship Program of the National Fellowships of Health, Martin Luther King Fellowships, and additional fellowships provided by private foundations and grants. Students should apply directly to these foundations. Addresses and information may be obtained from the School of Graduate Studies.

Tuition Scholarships

A number of tuition scholarships are available to beginning graduate students who are residents of Utah. Inquiries should be directed to the Office of Student Services. Also, there are a limited number of waivers of out-of-state tuition in recognition of excellent scholarship. Applications should be made to the dean, School of Graduate Studies. (See catalog section on Scholarships.)

Interdepartmental Curriculum in

Curriculum Development and Supervision

The College of Education offers an interdepartmental program leading to the EdD in Curriculum Development and supervision. This degree is offered to those preparing to become curriculum specialists, coordinators, or supervisors in public school systems and to those preparing to teach at the college or university level in teacher preparation in one of the six participating departments listed. These departments are: Elementary Education, Secondary Education, Special Education, Physical Education, Business Education, and Music. The Advanced Education section as well as the Aptitude part of the GRE must be taken.

For information concerning this degree, write to the head of the department or the chairman of the Doctor of Education Committee in Curriculum Development and Supervision in the College of Education.

Interdepartmental Curriculum in

Ecology

The USU Center of Ecology was created to coordinate research and teaching programs in Ecology on the USU campus.

Historically Ecology developed in several areas. Some form of Plant Ecology training or research developed in the Departments of Range Science, Botany, and Forest Science. Animal Ecology developed in the Departments of Wildlife Resources and Zoology.

Courses in environmental influences developed in the Departments of Geology and Soils and Meteorology.

The creation of the Center of Ecology allowed the development of an interdepartmental curriculum in Ecology pooling the resources of the seven departments, plus Bacteriology and Plant Sciences. It is now possible to earn graduate degrees in Plant Ecology in the Departments of Range Science, Botany and Forest Science, and Animal Ecology in the Departments of Wildlife Resources and Zoology.

Competence in Ecology requires background in a large number of disciplines. Although ecologists usually have had their primary training in Biology, they must also have some understanding of Geology, Soils, Meteorology, Chemistry, Physics and Statistics. To provide this background, the following courses should be completed in the undergraduate study: Trigonometry, Calculus, two quarters of Applied Statistics, General Chemistry and Organic Chemistry, Physics (one year), General Botany, General Zoology, Plant Taxonomy, Genetics, Plant Ecology and Animal Ecology.

Applicants for the MS degree in Plant Ecology are also required to show credit for Soil Survey and Classification (Soils 514), and Plant Physiology (Botany 440), plus a minimum of five courses from those listed below, including two from group A.

Applicants for the PhD in Plant Ecology must meet the requirements for the MS and show credit for an additional three courses from the list below, including one course each from groups A and B.

Applicants for the MS in Animal Ecology are required to show credit for an upper division course in Animal Physiology and five courses from the list below, including two from group B.

Applicants for the PhD in Animal Ecology must show credit for three additional courses beyond the MS including one each from A and B.

A research thesis is required for all degrees.

For a description of specific courses refer to the department headings.

Group A *Plant Ecology*[1]

Range	610	Plant Autecology
Range	611	Plant Synecology
Range	615	Plant Geography
Range	621	Ecophysiology
Bot	641	Plant Water Relations
Bot	630	Evolutionary Ecology
For Sci	670	Forest Ecology

Group B *Animal Ecology*[1]

Wildlife	415	Animal Behavior
Wildlife	630	Animal Population Ecology
Wildlife	760	Fish Population Theory
Zool	667	Zoogeography

Group C *Supporting Courses*[1]

Bot	642	Plant Growth and Development
Bot	646	Photosynthesis
Chem	370 or 670	Biochemistry
For Sci	671	Forest Ecosystem Analysis
Geol	560	Surficial Geology
Geol	636	Paleoecology and Biostratigraphy
Chem	370 or 670	Biochemistry
Met	225	Bioclimatology
Soils	555	Chemical Edaphology
Soils	565	Physical Edaphology
Wildlife	605	Analysis of Animal Behavior
Zool	365	Endocrinology
Zool	571	Mechanics of Evolution

[1]Tentative list.

Interdepartmental Curriculum in

Food Science and Technology

An interdepartmental graduate program leading to a PhD degree in Food Science and Technology is available to qualified students. An MS degree may be earned within the Department of Food Science and Industries. Facilities of several departments are available to PhD candidates. Active research programs are available in food chemistry, food microbiology, dairy products, fruit and vegetable processing, and meat processing.

All applicants for the PhD degree must have obtained a master's degree *or* must have presented a satisfactory manuscript on original research for publication, *or* must present a research report equivalent to a master's thesis for approval by the interdepartmental committee in Food Science and Technology before becoming eligible to enter the PhD program. Students entering this program should have had training in Chemistry (Organic and Elementary Biochemistry), Mathematics (including Calculus), Physics, and Biology.

The course of study for each PhD candidate may be tailored to his needs and interests through consultation with his major professor and supervisory committee. However, all PhD candidates must have satisfied certain minimum course requirements established by the interdepartmental committee or take them concurrently with their advanced degree program. Copies of minimum course requirements will be sent to interested students upon request.

All PhD candidates are required to assist in laboratory teaching equivalent to two laboratories per week for one quarter, or one laboratory per week for two quarters.

Dr. C. A. Ernstrom is currently Chairman of the Curriculum.

Interdepartmental Curriculum in

Nutrition

Facilities of the several departments conducting nutrition and biochemical research have been made available in this curriculum to afford students maximum opportunity to gain experience and training in the biochemistry of nutrition.

Major problems currently being studied are effects of toxic and non-toxic substances on digestion and metabolism, atmospheric pollution, cholesterol metabolism, amino acid metabolism, and other basic physiological processes related to nutrition.

Training in the curriculum is designed as preparation for research in educational institutions, governmental and industrial laboratories, and for college teaching.

Prerequisites for a major in the curriculum include basic training in English, Chemistry, Mathematics, Physics, Bacteriology, Botany, Physiology, and Zoology. For specific requirements for the MS or PhD degree write the curriculum chairman. Any deficient prerequisite work must be completed without graduate credit.

Master of Science Degree Requirements

Courses	Credits
Advanced Nutrition	10
Advanced Biochemistry	10
Statistics	8
Electives and Research	17-21
Total	45-49

Doctor of Philosophy Degree Requirements

Advanced Nutrition	18
Advanced Biochemistry	20
Statistics	12
Physical Chemistry	9
Physiology, Zoology, Pathology	20
Electives and Research	61
Total	146

For more specific details concerning admissions, requirements, and available scholarships and fellowships, write the curriculum chairman.

Chairmanship for the curriculum rotates every two years; chairman for 1971-72 is to be named.

Interdepartmental Curriculum in

Toxicology

The Toxicology curriculum allows for the study of the deleterious effects of chemicals (plant, animal, insect, or man-made toxins) at the system, organ, tissue, or cell levels. It encompasses both biological and physical disciplines. This interdepartmental approach provides unique opportunities for advanced training in the broad field of Toxicology with emphasis in a chosen discipline.

Graduates in Toxicology are prepared as research scientists in educational institutions, governmental and industrial laboratories, and for university teaching.

Extensive investigations of the effect of fluorine compounds on plants and animals, of the effect and mechanism of action of pesticides on animals and of teratologic effects of poisonous plants have been made at this institution in recent years. Recent investigations have been on animal venoms, noxious air and water pollutants, carcinogens, allergens and toxins of plant and bacterial origin. These toxicoses are studied in wild animals, game birds and fishes as well as in farm and laboratory animals.

Facilities for handling and housing all types of animals are available, either aquatic or terrestrial, wild or domestic. Modern laboratories are equipped to perform technical procedures in chemical and physical analyses, physiologic interpretations, ultracentrifugation, fluorescent tracing, radioactive isotopes, photography, tissue culture, histopathology and food technology.

Applicants for training in the curriculum may be students with an MD or DVM degree or with BS

or MS degrees in Nutrition, Animal Science, Food Technology, biological sciences or physical sciences.

Courses which will be required of candidates will depend upon their previous training and area of interest. Students trained primarily in biological sciences may need to strengthen their knowledge of basic physical sciences and vice versa. Students without medical degrees may need to strengthen their knowledge of Pathology, Physiopathology, and Pharmacology.

Chairmanship of the curriculum rotates on a three-year basis. Current chairman is LeGrande Shupe.

Interdepartmental Curriculum in

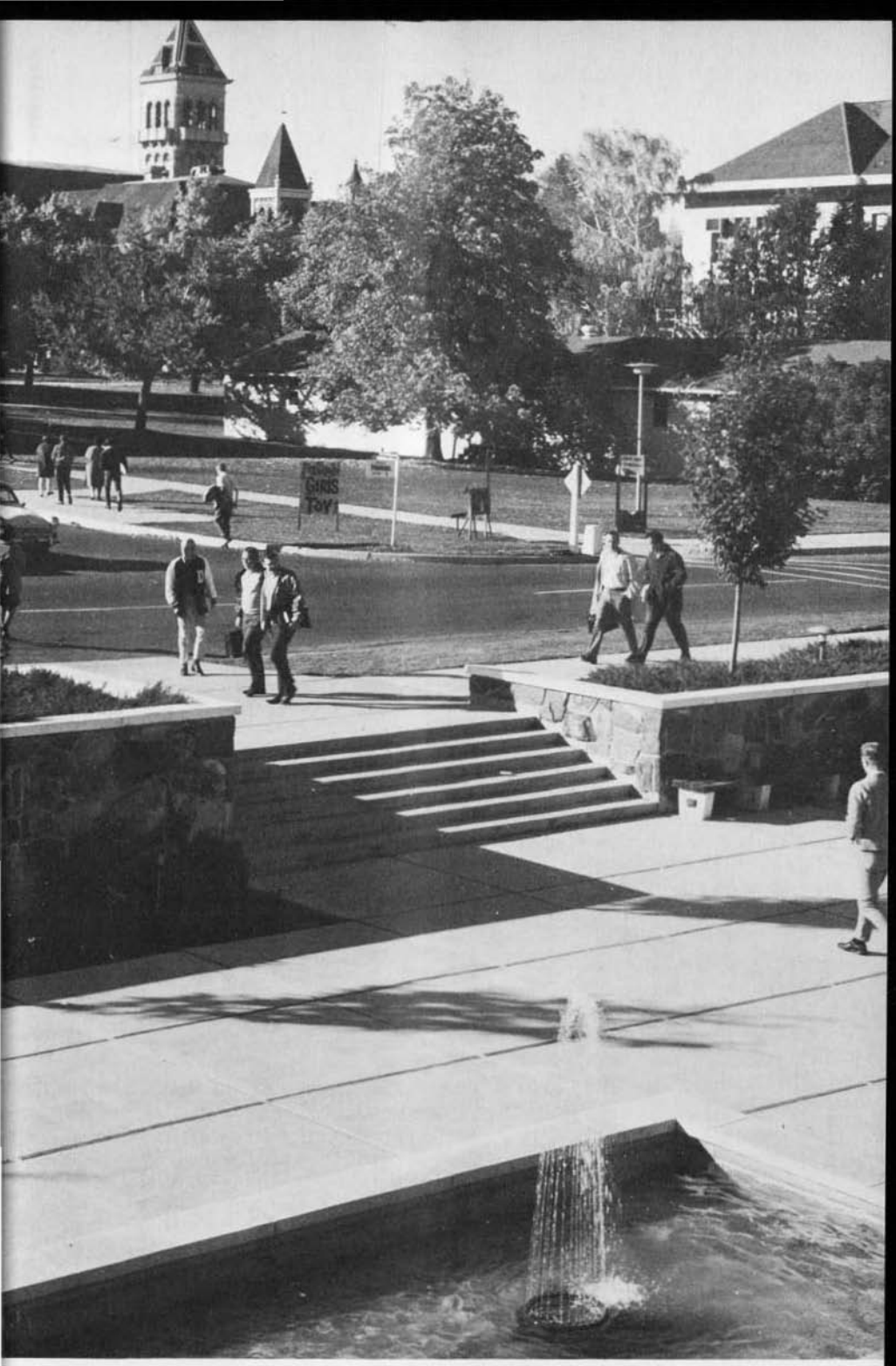
Water Quality

The interdepartmental program in Water Quality combines the resources of the Departments of Agricultural and Irrigation Engineering, Bacteriology and Public Health, Chemistry, Civil Engineering, Soils and Meteorology, and Wildlife Resources. Additional support, particularly for the research program is provided by the Utah Water Research Laboratory, the Center for Water Resources Research, and the Center for Pollution Research.

The curriculum is designed to involve graduate students from all pertinent disciplines associated with the major beneficial uses of water. The primary objective is to develop professional and competent people, at both the MS and PhD levels, who will be water quality specialists, possessing a breadth of understanding of the general scientific and technological context in which they must work.

A strong interdisciplinary emphasis is maintained in each student's academic program and research topic through the requirement of a minimum core of course work outside of his major department and a multi-discipline graduate committee. Upon successful completion of the program, degrees will be awarded by the department in which the student is enrolled.

The program is currently supported, in part, by two United States Departments of Interior, Federal Water Pollution Control Administration Training Grants. Interested students may apply for fellowships covering tuition, fees and a stipend. Director of the FWCPA Training Grants is N. B. Jones.



SUMMER QUARTER

Summer Quarter

Director Ellvert H. Himes
Office in Main 105
Quarter: June 14 - August 20, 1971
First Session — June 14 - July 16
Second Session — July 19 - August 20

The Summer Quarter at USU is one of the four quarters of which academic and cultural activities are offered during the school year. It is unique, however, in that there are special programs devised for professional advancement in specialized fields of endeavors. There are numerous short workshops, seminars, clinics, and institutes, as well as courses of full-quarter and five-week-session length.

The Summer Quarter is a 10-week period, as are other quarters of the year. It differs in that provision is made for two sessions of five weeks each. Each session allows a full quarter's work of a maximum of nine quarter credits. Thus, the student may fill his program by regular quarter classes or more intensive classwork in the shorter session of the quarter.

In some areas where classes are extensive, the graduate student may complete course requirements for a master's degree in three summers. The doctoral student may complete requirements for candidacy and supplement his candidacy with rich high-level classes and special seminars. The summer is also a busy time for those who wish to complete comprehensive examinations and hold special meetings with advisory committees for thesis proposals, guidance, and examinations.

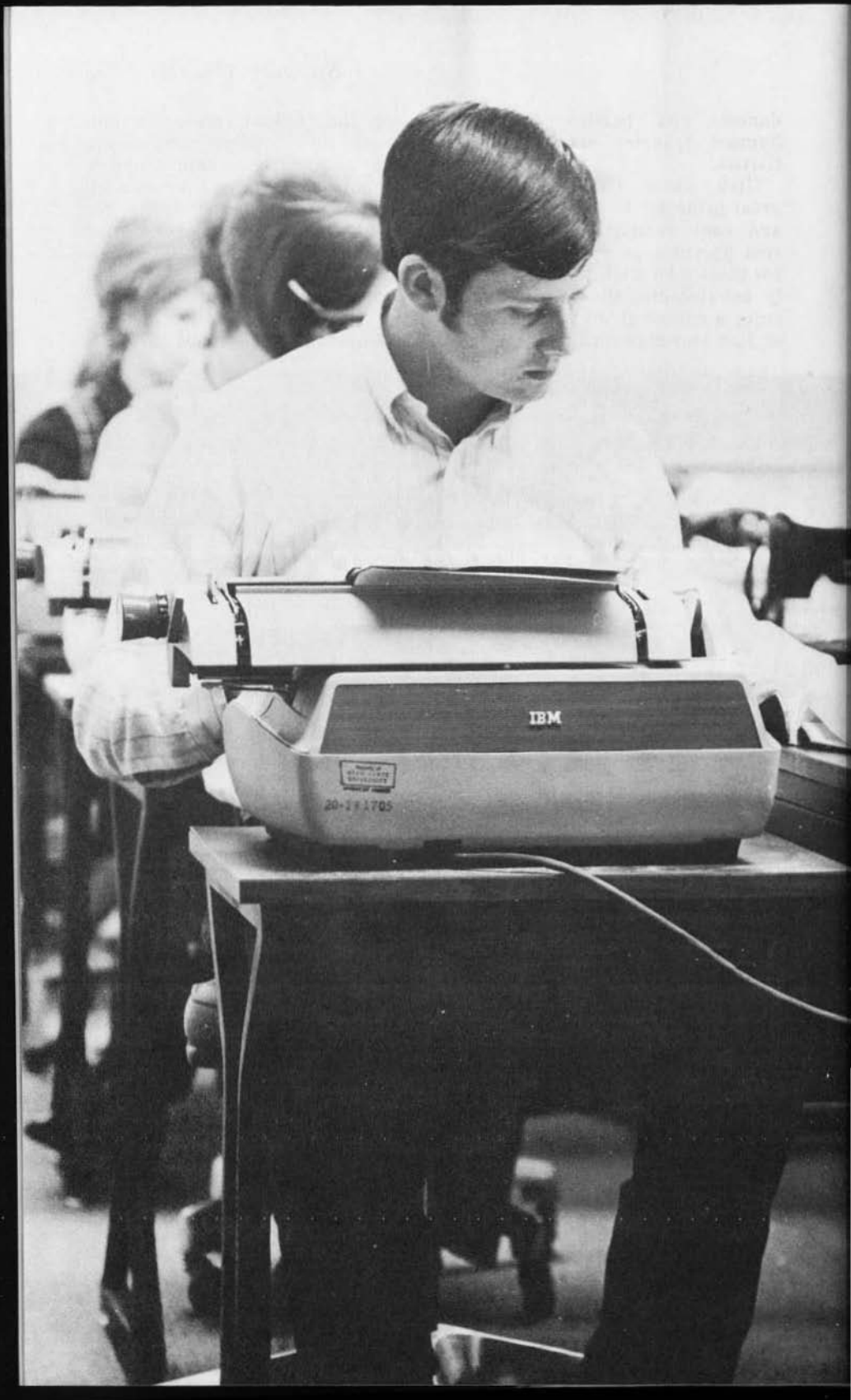
In the Summer Quarter the University's highly qualified resident faculty is augmented by distinguished visiting professors of national and international reputation. Many of these dignitaries are present for short lectures, special seminars, as well as the teaching of entire courses. Additional opportunities are provided for hearing these individuals of renowned achievement at luncheons and evening lectures. Thus, the student has an opportunity for personal contact with people of acknowledged distinction.

Numerous cultural advantages are available during Summer quarter. Recitals, concerts, dramas, and other special events encourage individuals of all ages in creative work, to participate and enjoy activities that enhance the growth and development of individual talents.

A distinguishing feature of the Summer Quarter calendar is the carefully planned program of recreation and enrichment. Despite the intensiveness of daily class work and library requirements, there are attractive opportunities supplied students in their various interest fields for out-of-class diversion and change of pace. The Coordinator of Student Activities provides a diversified program on campus of planned and unplanned activities in the University Center, on the quad, and other campus locations. Special tours, games, tournaments, and hikes are arranged and conducted by the Coordinator. Numerous outlets for snacks, relaxation, movies,

dances, and parties, highlight Summer Quarter extra-class activities.

Utah State University takes great pride in its luxurious green and cool campus. This beauty spot provides an enjoyable haven for those who wish to study quietly out-of-doors, those who might enjoy a casual stroll with friends, or just lounging on the lawns beneath the verdant trees. In addition to the inviting campus environs the nearby scenic canyons, national parks and monuments all provide special enducements for special evening and weekend trips and associating with friends. Such a pleasant climate and environment makes summer study at Utah State University a profitable and enjoyable experience.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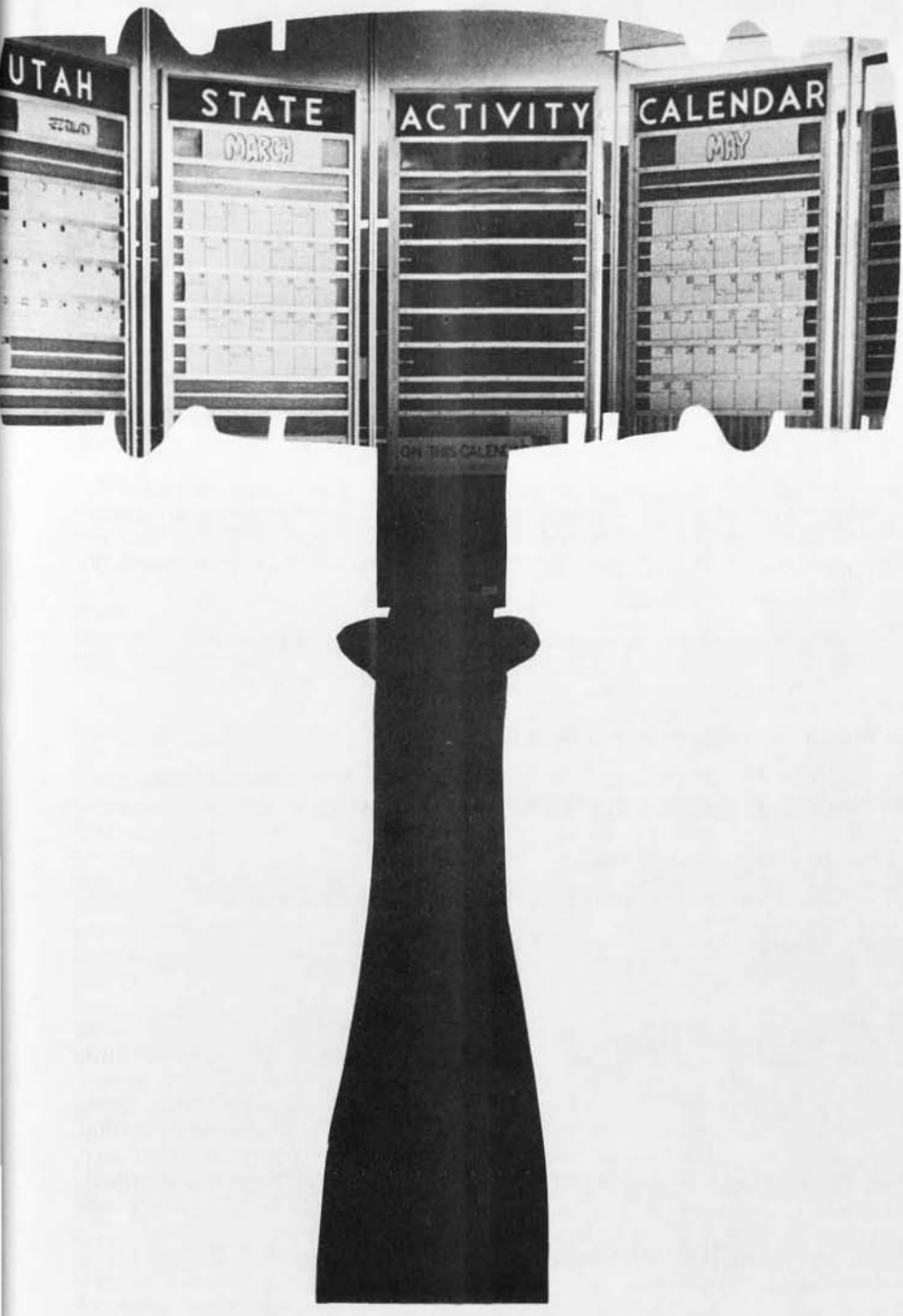


STUDENT SERVICES AND ACTIVITIES

Student Services and Activities

Vice President for Student Affairs Claude J. Burtenshaw

Assistant to the Vice President J. Lyn Larson

Dean of Women Helen Lundstrom

Assistant to the Vice President and Chairman of Scholarships, Awards and Honors John R. Williams

Coordinator of Student Activities and Director of University Center Val R. Christensen; D. LeRoy Dennis, Bruce E. Darley, and Karl Ward, Assistants

Coordinator of Student Housing William W. Skidmore; Mariann L. Johnston and Lee G. Osborne, Assistants

Coordinator of Counseling and Testing Ronald S. Peterson; Keith T. Checketts, Assistant

Coordinator of Student Health Services Willis Hayward

Student Employment Placement Supervisor Blair Hale

Foreign Student Adviser LaMar Frandsen

Coordinator of High School Relations and Student Programming Rodney Clark; Louis Paul Murray, Assistant

Student Loans Officer Reese T. Murray

University Program Center Director Richard B. Watkins

Supervisor, Division of General Registration Lewis A. Civille

Office in Main 102

The function of Student Services is to assist students to adjust to the University. It is so organized and coordinated with the academic offerings as to become an integral part of the broad educational program of the institution. Features of the program include: high school cooperation; orientation activities; personalized advisement and counseling services; recreational and social activities; health services; supervised campus and off-campus living arrangements; financial aids in the form of scholarships, awards, grants-in-aid and loans; employment placement for part-time and graduate needs; special assistance to students from outside the United States; opportunities for meeting religious needs and development.

The administration and coordination of the entire program of student services is the responsibility of the Vice President for Student Affairs. Each of the various services is under the direction

of specialists and qualified faculty members who have been carefully selected to consider each student in reference to his or her particular needs.

Inquiry from prospective students and those on campus who wish to obtain information and assistance with personal needs or out-of-class activities should be directed to the Office of Student Services, Main 102.

Religion

The traditional philosophy of separating church from state does not mean that the University may not have an interest in religion. A university education, USU officials believe, should permit opportunities for religious participation and exploration.

Catholic, Protestant and LDS Churches offer religious courses for USU students in their near-campus educational facilities. Credit earned in non-sectarian University-approved courses may be transferred at the request of the student to his University transcript. Credit courses are considered as part of the student's academic quarter load at the University. Academic quarter load limits may be exceeded only with the academic dean's approval.

The churches also provide religious services, personal counseling and social activities. USU officials are interested in the spiritual and moral understanding of students and encourage them to participate in the church of their choice.

Housing

All Freshmen and transfer students not living at home are encouraged to live in University housing. This provides students an opportunity to become better oriented to the campus, with its academic and social centers; and tends to promote a living and learning experience through discussion, organization and intellectual exchanges peculiar to campus life.

Each residence hall has a head resident couple to assist with student-planned social programs and consult on personal problems.

Residents must be regularly enrolled students at Utah State University. (Cost subject to revision.)

University Housing for Single Students

Apartment - Living Residence Halls will accommodate six women in an apartment. Accommodations consist of combination living room-kitchen, bath, and three bedrooms. The living room-kitchen is equipped with electric refrigerator, electric range, table, chairs, and draperies. Housekeeping items are furnished by tenants. Cost of telephone and electricity is shared by the occupants. Rent is $100 to $110 per quarter.

Richards Hall, a conventional board-and-room residence hall, accommodates 210 men. Twenty meals per week are provided in the Food Service Center. Linen changes, bedding, study desks, lamps, and utilities are furnished. Towels and other personal effects are not furnished. Costs include: double room (eight men per suite) $271 per quarter; double room (six men per suite with carpeted lounge study room) $285 per quarter; single room (four men per suite) $305 per quarter.

Bullen Hall, an apartment-type residence hall, accommodates 144 men. An apartment consists of a living room-kitchen combination, a bathroom, and three large bedrooms. The living room-kitchen combination is equipped with an electric refrigerator, built-in electric range, table, chairs, and draperies. Housekeeping items are furnished by the tenants. Cost of electricity and telephone expenses are shared by the six men in the apartment. Cost for one quarter is $100 per person.

High Rise Dormitories for Men and Women

The newest residence hall complex on the campus consists of two seven-story high rise buildings and a food service center. One building will accommodate 392 single women; the other, 392 single men. These are *board and room accommodations* providing 20 meals per week. Linen changes, bedding, study desks, lamps and utilities are furnished. Towels and other personal effects are not furnished. Each building has 24 single occupancy rooms. The remainder of the rooms accommodate two students each. Fine features of this new housing complex include elevators, TV room, study lounges, and typing and music practice rooms. An inservice library has been introduced to provide more living-learning experiences.

Rates are $285 *per quarter for double occupancy;* $305 *per quarter for private single room. There are no accommodations without board.*

LDS Student Living Center

The David O. McKay Student Living Center is composed of seven apartment buildings — four for women and three for men. They are designed as family living units with six students in an apartment, and are located on 10th North and 12th East. Charges are comparable to University housing. The units house 288 women and 216 men. There is ample parking and city bus service on the half-hour. Address all inquiries and applications to Housing Manager, David O. McKay Student Living Center, 10th North and 12th East, Logan, Utah.

Living Accommodations for Married Students

Van Noy Apartments, University owned, are located six blocks north of Old Main on the corner of 8th East and 12th North. These apartments are housekeeping-type units, three bedrooms furnished, fully carpeted (except in the eating area) with study area. A coin-operated launderette services the area.

The rent is $125 per month plus cost of utiilties.

University apartments for married students are located at 10th North and 12th East. The tenant pays for electricity and heat in addition. Each apartment includes electric refrigerator and range, and drapery on the living room window. All other furnishings must be provided by the tenant. No television antennas will be permitted on the roof.

Monthly charges are: one-bedroom apartments, carpeted, $80 per month unfurnished, $90 per month furnished. Two-bedroom apartments, carpeted, are $90 per month unfurnished, $100 per month furnished. Two-bedroom apartments, uncarpeted, $75 unfurnished, $85 furnished. Three-bedroom apartments, carpeted, are

$105 per month unfurnished, $115 per month furnished. (Rates are subject to change without notice.)

University Trailer Court, for married students, is located on the corner of 12th East and 11th North, and provides modern trailer connections to sewer and water mains. Students are encouraged to bring private trailers. These must be modern, sanitary trailers. Parking space is hard surfaced. A utility house provides laundry space and rest rooms. The University provides coin-metered washing machines and dryers. No provision is made for use of private-owned laundry equipment. Monthly space rental per trailer home is $22. Tenants are required to comply with safety regulations.

Application for Housing

Prospective students are invited to direct inquiries and requests for application to Coordinator of Student Housing, 1151 East 7th North, Utah State University, Logan, Utah. Upon request, an application form will be furnished. This application should then be completed and returned with the $25 application fee. Housing assignments are made on a receipt of application priority basis.

An accepted housing application qualifies a student for housing accommodations only. Application for University admission should be made to the Office of Admissions and Records, Main 110.

Housing Regulations

Students living in University-owned residence halls agree by written contract to retain their accommodations for the academic year. Rents are payable in advance. Accounts become delinquent 10 days after scheduled payment. A penalty of $1 late fee is imposed. The $25 fee is forfeited if 1) notice of withdrawal from University housing is made after August 1 in the case of Fall Quarter, December 1 for Winter Quarter, and March 1 for Spring Quarter, or 2) a student moves from the assigned hall prior to the end of the period covered by the agreement.

Dogs, cats and other similar pets are strictly forbidden within the University housing areas. Very few private home owners permit pets.

Off-Campus Housing

The Housing Office checks off-campus housing and establishes an approved list for students. Many apartments, rooms, board and room, and batching quarters are available in the community. In each instance the final arrangements must be made with the landlord. Rates are determined by the accommodations offered. Most board and room situations consist of 12 to 14 meals per week. The noon meal is rarely provided by the landlord. A noon meal can be purchased in the University Center Cafeteria on campus for about 75¢. This arrangement costs an off-campus student about $80 per month. Sleeping rooms range from $25 to $35 per month for a single room, and $50 to $95 per month for apartments.

Students living in private housing are obligated to retain their accommodations for at least one quarter. Rents are payable in advance. A two-week prior notice of intent to vacate should be made with the householder whenever a student intends to vacate a living accommodation.

Students desiring off-campus housing may procure the current housing list upon arrival at the

University, at the Housing Office, 1151 East 7th North.

Sorority and Fraternity Houses

Sorority and fraternity houses provide board and room for their members and are managed by their own officers. Each has a University-approved housemother in a supervisory capacity. Rates are determined by the house manager and compare favorably with other living rates on campus.

Food Service

Food service is obtainable in the University Cafeteria located in the University Center on campus. Monday through Friday schedules are: Breakfast 6:45-8 a.m., Lunch 11 a.m.-1 p.m., Dinner 5-5:30 p.m. Saturdays: Breakfast 8-8:30 a.m., Lunch 11:30 a.m.-12:30 p.m., Dinner 4:30-6 p.m. The cafeteria is closed on Sunday, but the High Rise Cafeteria remains open. The snack bar in the University Center operates 8 a.m.-10 p.m. Mondays through Fridays and 8 a.m.-2 p.m. on Saturdays.

The Walnut Room Restaurant in the University Center is open during weekdays only, from 11:30 a.m.-1:15 p.m. The menu offers a variety of salad luncheons, hot sandwiches, and complete dinners. Faculty, students, and public are invited to take advantage of this facility.

Awards, Honors, Scholarships and Grants-in-Aid

The University offers a variety of scholarships and awards. Some of these are actual money grants in varying amounts, other provide for registration and tuition fees to be waived. The latter kind generally come under the classification of tuition scholarships and awards.

The primary purpose of the tuition scholarships and awards is to assist new students who have high scholarship and financial need in becoming established in college. These scholarships are discussed in greater detail under the section of "Scholarships and Grants-in-Aid" for new students.

Most of the scholarships which consist of actual money grants are reserved for students who have been attending USU for at least one year and preferably two years or more. These are usually given in May of each year. Students interested in awards may obtain information from the Office of Student Services, Main 102. Closing dates for receiving applications are announced well in advance of such dates.

Scholarships and Grants-in-Aid

(Presented principally to students already enrolled)

All Colleges

The Lieutenant Clyde Parker Baugh Memorial Fund. A gift of Mr. and Mrs. Wilford F. Baugh, it provides scholarships annually for deserving students of high scholarship and leadership.

Business and Professional Women's Scholarship. An in-state tuition scholarship is awarded annually by the Logan Business and Professional Women's Club to a Senior woman student, from the Cache Valley area, who has maintained high scholarship, demonstrates need, shows qualities of citizenship and leadership, and who would contribute significantly to her chosen profession.

Annie Givens Anderson Gardner Loan Fund. This loan is for needy Freshman girls with no previous college training who are members of The Church of Jesus Christ of Latter-day Saints in good standing.

The Johansen Scholarship Fund. A gift of the late Mrs. Johana Johansen, it provides scholarships annually, worth in the aggregate from $125 to $150, for help of worthy students of Junior and Senior rank.

Phi Kappa Phi Scholarship. A $125 cash award given to one or two Junior students of

high scholarship and outstanding character.

Lorin Pollard Scholarship. One scholarship given annually by the parents of the late Lorin Pollard in his memory. This scholarship is given to a student of high scholarship and leadership.

Rhodes Scholarships. Candidates for Rhodes scholarships at Oxford University, England, are selected each year from Utah. High scholarship and some definite quality of distinction, whether in intellect, character, or personality, or in any combination of these, are the most important requirements. Seniors or graduate students are generally chosen as candidates. It is suggested, however, that students would do well to be preparing for the candidacy in earlier years. Information and application blanks may be obtained from the University representative, Rhodes Scholarship Committee.

Air Force ROTC Scholarships. These are available on a competitive basis to all students enrolled in the four-year program. The scholarships pay all tuition and fees, provide textbook allowance of $75 per year and $50 per month subsistence non-taxable cash. Eligible Freshmen, Sophomores and Juniors, including women enrolled in AFROTC, should apply directly to the Professor of Aerospace Studies.

The 1927 Class Gift to the College. This yields an annual income sufficient to provide four scholarships. Application should be made by Juniors and Seniors.

College of Agriculture

American Dairy Association of Utah. Three $100 scholarships are awarded annually to Freshman students. One award is given to an outstanding 4-H member, and one to an outstanding FFA member who will major in a Dairy curriculum. One is also awarded to an outstanding 4-H member enrolled in Family Life.

Automated Feeding, Inc. Award. A $500 scholarship provided as a prize in the Dairy Heifer Contest to be used for a Freshman in the Department of Dairy Science.

George B. Caine Dairy Scholarship Award. A $300 scholarship provided for an outstanding Dairy student as determined by scholarship, leadership and need.

Dairy Department Scholarships. Several scholarships of $100-$300 each are awarded each year to outstanding students entering or already enrolled in a Dairy curriculum in the Departments of Dairy Science and Food Science and Industries. Funds are supplied by dairy companies of Utah and the intermountain area.

4-H Scholarship offered by Alpha Gamma Rho. The national fraternity of Alpha Gamma Rho offers annually a cash scholarship of $200 to be applied toward a full-term course at any suitable accredited college of agriculture. The National 4-H Awards Committee has sole responsibility for selection of the winner from among the candidates nominated by the state 4-H Club leaders, such selection to be on the basis of scholarship, achievement and demonstrated need. Further information may be secured from Alpha Gamma Rho Fraternity, 706 West Michigan Avenue, Urbana, Illinois.

FFA Scholarship offered by Alpha Gamma Rho. The national agricultural fraternity of Alpha Gamma Rho offers annually a cash scholarship of $200 to be applied toward a full-term course at any suitable accredited college of agriculture. The American Vocational Association has sole responsibility for selection of the winner from among candidates nominated by the state supervisors of Agricultural Education, such selection to be on the basis of scholarship, achievement and demonstrated need. Further information may be secured from Alpha Gamma Rho Fraternity, 706 West Michigan Avenue, Urbana, Illinois.

First Security Foundation. A scholarship of $500 awarded to a student in Agriculture at the end of his Sophomore or Junior year.

Jenkins-Jones Memorial Scholarship. An award of $500 given to an outstanding upper division student in Agronomy. Available for school expenses the following year.

Ralston Purina Scholarship. A scholarship of $500 given in recognition and assistance to an outstanding Junior in Agriculture for use in his schooling the Senior year.

Sears-Roebuck Foundation Scholarships for Freshmen. Ten scholarships of $300 each are given annually to outstanding high school graduates of Utah who enroll to major in Agriculture at Utah State University. Available for school expenses the Freshman year.

Sears-Roebuck Foundation Scholarship for a Sophomore. A scholarship of $300 to a Sophomore student in Agriculture who, among the recipients of the Sears-Roebuck Awards for Freshmen, had the highest grade point average the Freshman year. Available for school expenses the Sophomore year.

Sterling A. Taylor Memorial Scholarship. An award of $200 given to an outstanding upper division student in Soils and Meteorology. Application should be made by students during the Spring Quarter of their Sophomore or Junior year.

Utah Holstein Breeders Association Award. A $100 scholarship for an outstanding student who after one or more years in a Dairy curriculum has demonstrated a keen interest in

registered Holstein cattle. It is to be used in continuing his training in Dairy Science.

College of Business

Harry E. and Vera F. Carleson Scholarship in Economics. Two $200 scholarships given to outstanding Junior or Senior students majoring in Economics.

First Security Foundation Scholarship. Two $500 scholarships awarded to students of senior college standing who are studying Accounting or Banking and Finance.

Thiokol Corporation Scholarship. Scholarships awarded to outstanding students of senior college standing in the field of Accounting, Business Administration, or Economics.

Lynn H. Stevens Scholarship. This $100 scholarship is given to an outstanding Freshman student at the end of Spring Quarter who enrolls as a Sophomore student in the Army ROTC program. He must also show a desire to serve in the U.S. Army as a commissioned officer, pass entrance requirements for Advanced Course Army ROTC, have an academic standing of a minimum of 2.5 overall grade point average, and be selected by a Board of Officers appointed by the Professor of Military Science.

College of Education

U.S.O.E. Junior and Senior Traineeships in Mental Retardation. The U.S.O.E. offers several scholarships each year to prospective teachers in the field of mental retardation. The Junior recipients receive $300. The Seniors receive $800 plus tuition. Applications are made to the Department of Special Education Spring Quarter of each year.

U.S.O.E. Graduate Fellowships in Mental Retardation and Behavior Disorders. Seniors beginning graduate study or returning teachers are eligible to apply for these fellowships during the spring of each year. The recipient receives $2,200 plus tuition and dependency allowances. Application is made to the Department of Special Education.

U.S.O.E. Graduate Fellowships in Educational Audiology. Graduate fellowships are available in Educational Audiology from the U.S.O.E. Applications are made through the Department of Communicative Disorders. Awards include a $2,000 stipend, tuition, and dependency allowances.

College of Engineering

Industrial Education Club Scholarship. The Industrial Education Club of USU awards a scholarship of $50 to an outstanding Sophomore or Junior student majoring in Industrial Arts. The recipient is designated during Spring Quarter of each year. Applications are made to the Industrial Education Club and are judged on scholarship, need, school and club activities.

Kennecott Scholarship in Civil Engineering. A $1000 scholarship is awarded to a Junior Civil Engineering student interested in Hydrology and Water Resources. This outstanding award is given on the basis of scholarship and potential as an engineer during Spring Quarter each year.

Manufacturing Engineering Scholarship. Scholarships are awarded to Engineering students who show interest, ability, and scholarship in pursuing Manufacturing Engineering curriculum. Application should be made to the Manufacturing Engineering Department, USU, not later than March 1st of each year.

Frederick Preator Scholarship. An award of $200 is made to an outstanding Manufacturing Engineering student of Junior rank. Application should be made to the Manufacturing Engineering Department not later than March 1st each year.

Erick W. Ryberg Scholarship. A grant of $200 from the Utah Sand and Gravel Company is made to a student in Civil Engineering selected by a special committee.

Utah Masonry Advisory Board Scholarship in Civil Engineering. A $350 scholarship is given yearly to a Junior Civil Engineering student of outstanding scholarship having an interest in the construction industry.

Utah Power and Light Research Fellowship in Irrigation Engineering. To support a graduate student, this grant totals $4000. Of this, $2400 is given directly to the student and $1600 is given to the department in support of the student's research project.

College of Family Life

College of Family Life Scholarship. Two or more scholarships given to worthy students in the College of Family Life from contributions of alumni, friends, and staff of the college. The amount given depends on the contributions, as all monies are used within the year.

Greaves Memorial Scholarships. Two or more $125 scholarships in memory of Drs. Joseph E. and Ethelyn O. Greaves for students who have achieved in the field of Family Life and Science.

Moen Memorial Scholarship. Two $125 scholarships in memory of Johanna Moen given to worthy students in the College of Family Life who show outstanding aptitude in the field.

The Phi Upsilon Omicron Scholarships. One or two scholarships are given annually by the Kappa Chapter to Sophomore or Junior girls in the College of Family Life who are active members of the chapter.

Sears-Roebuck Foundation Scholarships for Freshmen. Two $300 scholarships given annually to outstanding high school graduates of Utah who plan to major in Family Life. Available for school expenses the Freshman year.

College of Humanities, Arts and Social Sciences

English Department Scholarship. The English Department awards annually one $150 scholarship to an outstanding student who has completed his Freshman year at USU. He must be an English major.

Esther V. Erickson Wrigley Scholarship. The Robert L. Wrigley family presents two scholarships annually to English majors in memory of Mrs. Wrigley. One $175 scholarship is given to an outstanding student of Sophomore standing and one $225 scholarship is given to an outstanding student of Junior rank.

Herald Journal Scholarship in Journalism. The Logan Herald Journal annually presents a $50 scholarship at the beginning of the Winter Quarter to help some worthy Journalism student continue at the University.

Peter O. Holmgren Scholarship. Awarded annually to a student in the College of Humanities and Arts. Application for the $100 scholarship should be made to the Dean of the College on or before April 1.

Deseret News Professional Internship in Journalism. The Deseret News offers the outstanding Junior student in Journalism a scholarship for $150 and employment with the News, either at Salt Lake City or at one of its bureau's during the summer between the Junior and Senior years. The winner is selected by judges representing USU and the News.

W. Mont Timmins Essay on the Pioneering of Cache Valley. A $50 prize is awarded annually by the Timmins family for the best essay of an aspect of pioneering in this valley, from earliest recorded times to present. Open to all undergraduates. Details from USU English Department.

A Cache Valley Cooperative Scholarship. This scholarship of $7,000 bears interest at 6 percent, earning $420 annually. This scholarship is limited to graduate students in the Departments of Sociology, Agricultural Economics and Dairy Science. A thesis on some phase of cooperation is involved. For information inquire from the department head involved.

O. Guy Cardon and M. N. Neuberger Scholarship in Social Science. The Bluebird Candy Company at Logan offers a scholarship in the social sciences: Economics, History, Political Science, and Sociology, in honor of the late O. Guy Cardon and of M. N. Neuberger. Applicants majoring in the fields indicated should contact the Dean of Social Sciences.

Joseph A. and Grace W. Geddes Scholarship. Limited to graduate students in Sociology. Present values of $7,000 is comprised of $2,000 contributed by the Utah Cooperative Association and smaller amounts from students and friends. Annual stipend $200. The Sociology staff supervises the funds by adding to its earnings and donations, aiding students to select projects useful to society, and supervising studies.

Social Work Scholarships. Earnings from an endowment fund established in 1937 provides an annual scholarship award for a student majoring in Social Work. Junior and Senior women in Social Work are eligible for consideration. The amount of the grant varies from $100 to $200 per student.

College of Natural Resources

The Paul M. and Neva Dunn Scholarship in Forestry. See dean's office for details.

The Fraternal Order of Lumbermen, Club No. 70, awards annually an indefinite number of scholarships for worthy Forestry students in the College of Natural Resources. The scholarships are awarded on the basis of scholarship and financial need. They are awarded to entering Freshmen, and are $100 minimum. Applications should be made to the dean of the college not later than October 1.

The William G. Kohner scholarship fund for Junior, Senior and graduate students in the College of Natural Resources. Income from the fund will be used annually for scholarships to deserving students.

American Society of Range Management Scholarship. One scholarship for the best Range senior in the State of Utah. The scholarship is in the amount of $100, and application should be made to the head of the Department of Range Management by June 1.

College of Science

Christenson Memorial Scholarship. One $250 scholarship in memory of Leroy Dean Christenson for Senior students in Zoology or Entomology. The award is based upon scholarship, character, and professional promise. The funds from which the award is made were contrib-

uted by the family and friends of L. D. Christenson; the fund is administered by the Department of Zoology.

Greaves Memorial Scholarships. Two or more $125 scholarships in memory of Drs. Joseph E. and Ethelyn O. Greaves for students who have achieved in the fields of Science and Family Life.

Scholarships and Grants-in-Aid

(Primarily for new students)

The University grants annually scholarships covering from one to three quarters' tuition each on the basis of outstanding academic ability or demonstrated ability in the areas of Speech, Drama, Music, Art, Athletics, Commercial Training, and other academic subjects. Tournament and contest winners frequently receive these awards.

High school students who have served in major and responsible positions of leadership in school may receive a leadership award.

To be eligible to apply for an academic award, a high school student must have a full B+ (3.5) average or better in all subjects at the end of the Junior year of school.

To be eligible to apply for a leadership award, a high school student must have a C+ (2.5) average or better in all subjects at the end of the Junior year of school.

The University also awards grants-in-aid to help deserving students who have economic need.

To be eligible for a grant-in-aid, a student must meet either of the following requirements:

1) A Freshman must have been academically rated as in the upper two-thirds of his high school graduating class. For the first year such award shall be made on an annual basis.

2) A student, other than a Freshman, must be in good academic standing and not on probation. Such award shall be made on a quarterly basis.

All of the above awards are under the jurisdiction of a Scholarship, Awards and Honors Committee, which alone has the authority to promise or grant an award. All applications for grants-in-aid or scholarships should be made to the chairman of this committee.

All scholarships and grants-in-aid must be applied toward the payment of tuition or fees.

Any scholarship or grant-in-aid may be withdrawn at any time for academic or other good and sufficient reasons, if, in the judgment of the Vice President for Student Affairs, the recipient has clearly demonstrated his failure to comply with both the spirit and the letter of the original terms of the scholarship or grant-in-aid.

Tuition Scholarship. The President of the University is authorized by Title 53, Chapter 34, Section 1-a, Utah Code Annotated, 1953, to waive registration and tuition fees in full or in part for a limited number of meritorious or impecunious students who reside in Utah.

USU Faculty Women's League Annual Scholarship. This provides $125 for one year for a Freshman woman. Selection is based on need, scholarship, and leadership.

Union Pacific Scholarships. The Union Pacific Railroad awards 16 scholarships annually to Juniors or Seniors in high school who are enrolled as 4-H Club members, also 16 to FFA members. These $400 scholarships are available in the following counties: Beaver, Box Elder, Cache, Davis, Iron, Juab, Kane, Millard, Morgan, Rich, Salt Lake, Summit, Tooele, Utah, Wasatch, Washington, and Weber.

Intercollegiate Knight Scholarship. Two $100 scholarships will be given based on a combination of scholastic and leadership ability. The recipients must be single, male, from out of state, and of the Freshman class. They will be asked to attend one of the regular IK meetings and tell the group about their future plans.

Logan Kiwanis Club. A $100 scholarship is awarded each year. The award is made available to one college each year, in alphabetical sequence among the colleges. Each dean, in his turn, selects an outstanding student in his college to receive the award. They also support the Circle K Club.

Logan Lions Scholarship. The Logan Lions club will award two $100 schoarships to be given to students selected by the Logan Lions Scholarship Committee. Nominees for the scholarship will be selected by the Office of the Vice President for Student Affairs. Emphasis will be given to need. Scholarships will be awarded to a Sophomore or older student for either Winter and/or Spring Quarter.

Logan Rotary Club. Three $100 scholarships awarded to outstanding students who are in need of financial assistance.

National 4-H Club Contests. National scholarships of $300 each are available to 4-H Club members in at least 22 different projects or activities.

Woodey B. Searle Scholarship. A tuition scholarship is awarded each year by Woodey B. Searle to a needy and deserving graduate of the Uintah High School. Applications should be filed before April 15th with the principal of the UHS at Vernal.

Sears-Roebuck Foundation Scholarship. Thirteen scholarships of $300 each are awarded annually by the Sears-Roebuck Foundation to Freshmen in the College of Agriculture. Selection is made from graduating Seniors of the high schools of Utah on the basis of interest in agriculture, scholarship, leadership, and financial need. The winner who has the best scholastic record at the end of his Freshman year receives an additional scholarship for use in his Sophomore year.

Sears-Roebuck Foundation Scholarship in Family Life. Two scholarships of $300 given to an incoming Freshman student in the College of Family Life who has a high scholastic standing, leadership ability, and promise of achievement.

Standard Oil Scholarships. The Standard Oil Company of California offers five scholarships to 4-H Club members in Utah and five scholarships to FFA members in the amount of $300 each.

Utah Dairy Federation. The Utah Dairy Federation gives an annual scholarship of $100 each to a 4-H boy and a 4-H girl who will enroll in Dairy or Home Economics at USU.

Awards and Honors

William Alger Awards. A gold key is awarded annually by Alpha Epsilon Delta, pre-medical society, to the outstanding Freshman pre-medical or pre-dental student. Scholarship, character and possibilities in medicine or dentistry represent the basis for the award.

Alpha Kappa Psi Scholarship Key Award. Alpha Kappa Psi Fraternity, Alpha Theta Chapter, established at USU, awards annually the Alpha Kappa Psi Scholarship Medallion to the male Senior in Business with the highest scholastic average for four years of study in this University.

Alpha Kappa Psi Scholarship Key. Awarded to a male student of the Senior class in Busines who possesses the highest scholastic average for three years' work taken at the University.

Alpha Lambda Delta Award to Senior Students. Book Award: An award to a Senior woman who has been an Alpha Lambda Delta member and who carries the highest grade-point during her four years of college.

Alpha Zeta Award. An award is made annually by Alpha Zeta fraternity honor society of Agriculture and Forestry students, to the Sophomore in Agriculture or Forestry who made the highest scholastic record in his Freshman year. The name of the winner is engraved upon a permanent trophy.

American Institute of Electrical Engineers. Awarded annually to the member of the student chapter who has contributed most to the IRE organization, and who has demonstrated professional ability. This award consists of a certificate of merit and one year's dues as an associate member of AIEE.

American Institute of Electrical Engineers Student Award. This award is made each year to the outstanding Senior Electrical Engineering and AIEE member. The award consists of one year's dues as an associate member of AIEE and a certificate of achievement.

The American Legion Military Medal. A gift of the Logan American Legion Post, it is awarded each year to the athletic letterman who maintains the highest scholastic record during the year, and who exhibits the most wholesome attitude toward military training.

The American Rambouillet Sheep Breeders' Association Challenge Cup. To be presented each year to the student showing the greatest efficiency in fitting and showing Rambouillet sheep.

American Society of Agronomy Leadership Award. A plaque to the outstanding Senior in Agronomy.

American Society of Civil Engineering Associate Memberships. Awarded annually to Senior Engineering students on the basis of scholarships, promise of success in engineering,

personality, and ASCE student chapter activity. The awards consist of associate memberhip in the American Society of Civil Engineers. The first is given by the Intermountain Section of ASCE, the second by the Civil Engineering faculty, and the third by the student chapter of ASCE.

ASCE Membership Award. Junior membership in the American Society of Civil Engineers is awarded by the Intermountain Section, ASCE, to a graduating Senior in Civil Engineering on basis of scholarship, activities, and personality. Selection is made by the Engineering Faculty.

ASCE Student Chapter Award. Junior membership in ASCE to the Senior doing most for the chapter. Selected by vote of members.

The Barnes Key. Rey and Marjorie Barnes award a key annually to an undergraduate student who is affiliated with the campus radio or television station. The student must have a cummulative grade point average of 2.5 or above, must have carried at least one radio class during the year of the award, and must have demonstrated a deep interest in furthering radio and television arts at Utah State University. Selection shall be made by the Director of Radio and Television at USU, the person directly responsible for the campus radio station, and Rey L. Barnes.

Blue Key Award. Each year Blue Key Honorary Service Fraternity awards a "Service Plaque" to an outstanding Freshman or Sophomore male student. Candidates are judged on University activities, scholarship, service to the University, and moral character. Application forms can be obtained from the organization and must be filed with the Blue Key Awards Committee on or before April 15.

Burpee Award in Horticulture. An annual award of $100 to the student in Horticulture who rates highest in scholarship, practical experience and interest in flower, vegetable and seed growing.

Cache Valley Chapter of the Utah State Historical Society Award. The Cache Valley Historical Society offers annually an award of $25 to the USU student writing the best acceptable treatise on any phase or field of Cache Valley history. Papers must be submitted on or before the end of the Spring Quarter and become the property of the Cache Valley Historical Society.

Chemical Rubber Publishing Company Freshman Chemistry Award. The Chemical Rubber Publishing Company annually awards to an outstanding Freshman in General Chemistry, a copy of its Handbook of Chemistry and Physics.

Chemistry Faculty Award. The staff of the Chemistry Department annually awards a copy of the Handbook of Chemistry and Physics to the outstanding Freshman student completing Chemistry 105 and 106.

Chi Omega Fraternity Award. An award of $25 is given annually to the girl majoring or minoring in Social Sciences who gives evidence of superior scholarship and ability to make a contribution to organized group life. The Committee of Awards is appointed by Chi Omega Fraternity each year from the teaching staffs of the Sociology and Economics Departments.

Civil Engineering Faculty Award. Junior membership in the ASCE or ASAE is awarded by the Engineering faculty to a graduating Senior in Engineering on the basis of scholarship and promise of success in engineering. Selection is made by the Engineering faculty.

Virginia Dare Award. A cash award of $25 to the outstanding Junior in Dairy Manufacturing.

Danforth Foundation Family Life Fellowships. The first is awarded jointly by the Danforth Foundation and Ralston Purina Company to an outstanding Junior in the College of Family Life. The award provides for two weeks' study of business problems in St. Louis, followed by two weeks of leadership training at the American Youth Foundation Camp on Lake Michigan. The second is awarded by the Danforth Foundation to an outstanding Freshman in Family Life. The award provides for two weeks' leadership training at the American Youth Foundation Camp.

Danforth Summer Award. Awarded to an outstanding Freshman in Agriculture. This award covers the expenses of two weeks' leadership training at the American Youth Foundation Camp on Lake Michigan. Transportation is up to the individual.

Danforth Summer Fellowships. Awarded to an outstanding Junior in Agriculture. This award covers the expense of two weeks' marketing and research study at St. Louis and at the Purina Research Farm nearby and two weeks' leadership training at the American Youth Foundation Camp on Lake Michigan.

Delta Beta Chi Award. Ten dollars is awarded anually by the Delta Beta Chi Chemistry Fraternity to the Freshman or Sophomore Chemistry student who writes the best essay on some subject in chemistry.

Distinguished Service Awards. Awards are given annually to outstanding students in Theatre, Music, Library, and Physical Education.

Faculty Women's League Democracy Award. This is awarded to Senior women. Candidates must have evidenced the best understanding of the democratic idea in its application to

University life; as exemplified by the following considerations: 1) awareness of issues vital to university life, 2) individual responsibility for their solution, and 3) accommodation of individual interests to what seems to be the common good. (University award winner excluded.)

Faculty Women's League Scholarship Award. Awarded to Senior women, based on scholastic records for full undergraduate work. To be eligible for this award, candidates must have spent at least two years at this institution. (Valedictorians excluded.)

Farm Bureau Agricultural Leadership Award. An award of $200 to the Senior who has exhibited the greatest measure of growth and excellence in scholarship, constructive organization and leadership in the College of Agriculture throughout his university course. The winner's name will be engraved on the Caine Leadership Plaque.

Foreign Student Achievement Award. A certificate of achievement to a graduating foreign student from a non-English speaking country who has the highest scholastic average during his undergraduate study.

The Hawaiian Steamship Company's Challenge Cup. Awarded each year to the student who shows the most proficiency in judging wool.

Institute of Radio Engineers Award. This award is made each year to the outstanding senior Electrical Engineer and IRE student member. The award consists of one year's dues as associate member of IRE and a certificate of achievement.

The John K. Madsen Challenge Cup. Awarded each year to the student who shows the greatest proficiency in judging sheep.

Logan Kiwanis Club Trophies. Each year, the dean of each of the eight colleges selects an outstanding student in his college to receive the Kiwanis Club Plaque.

Mechanical Engineers Faculty Award. An engineering handbook awarded annually to the Mechanical Engineering Senior with the highest grade point average. The award is made by the Mechanical Engineering faculty.

Merck Award. Merck and Company, manufacturing chemists, award annually a copy of the Merck Index to an outstanding student in Organic Chemistry and Biochemistry.

National Business Education Association Award. An award presented by the National Association for Business Teacher Education to the Senior who has distinguished himself in Business Education.

The Ogden Union Stockyard Challenge Cup. Awarded each year to the student who shows the most proficiency in judging beef cattle.

Phi Upsilon Omicron Award to Freshman Students. A charm necklace is given to a Freshman in the College of Family Life on the basis of scholarship, activities, and personality. The candidate must be a member of Zeta Epsilon.

Proctor and Gamble Award. A trophy is given to a graduating Senior in the College of Family Life on the basis of scholarship, activities, and personality.

Rolla M. Rich Memorial Award. An award of $50 to an outstanding student in Agriculture in the upper division, who is active in the LDS Church.

The ROTC Medal. A gift of the institution is awarded each year to the student in Military Science and Tactics who most nearly represents the ideal that the Reserve Officers' Training Corps is striving to develop, upon the following basis: a) character, 20 points; b) scholarship, 15 points; c) University activity, 15 points; d) leadership, 20 points; e) aptitude for an interest in Military Science, 20 points; f) physique and bearing, 10 points.

The Salt Lake Union Stockyards Company Challenge Cup. Awarded each year to the student who shows the most proficiency in judging hogs.

Scholarship A's. In the form of gold pins, these awards are given to undergraduate students who present evidence that their grades are all "A's" for three consecutive quarters of their residence. At least 15 credits must be carried. The grades of any quarter can be used but once toward a Scholastic Award.

Sigma Tau Award. To the outstanding Sophomore Engineering student for scholarship, sociability and practicability. Selection made by the Alpha Delta Chapter of Sigma Tau, an honorary engineering fraternity.

J. Fish Smith Award. An award of $100 for the promotion of international relations, given to a foreign student in recognition of excellence in scholarship and contribution to international understanding and good will.

Son of Paul Award. Awarded to the graduating Senior in the College of Natural Resources who has maintained a high academic record and shows promise of achieving outstanding professional success.

United Business Education Association. An award presented by the Smead Manufacturing Company to the Senior who has distinguished himself in Business Education.

Utah Association of Certified Public Accountants. An award for the purpose of

stimulating interest to the outstanding Senior student majoring in Accounting.

Utah Feed Manufacturing and Dealers' Association Award. An award of $100 to an outstanding Senior with a major in some phase of Animal Science, preferably one interested in Animal Nutrition.

Utah Society of Professional Engineers. An annual presentation of certificate of merit to the outstanding Senior Engineering student at USU.

Utah State Historical Society Award. An award to the outstanding graduate majoring in History.

Utah State University Business Education Student Teacher Award. This honorary award is presented to one or more Senior student teachers who have exemplified superior ability and excellence in completing their student teaching experience leading to the BS degree.

The Utah State University Science Medal. A gift of the late Director Emeritus William Petersen, it is given each year to the student writing the best review of recent scientific research in either Mathematics, Physics, Chemistry, Geology, Zoology, Botany or Astronomy.

Wall Street Journal Award in Accounting. A medal and one year's subscription to the **Wall Street Journal** for outstanding achievement in Accounting.

Wall Street Journal Award in Business. A medal and one year's subscription to the **Wall Street Journal** is given for outstanding achievement in Business Administration.

Wall Street Journal Award in Economics. A medal and one year's subscription to the **Wall Street Journal** for outstanding achievement in Economics.

Colonel Joe E. Whitesides Award. This award is given to the outstanding student-athlete selected by the Athletic Council on the basis of 1) academic achievement, 2) athletic achievement, 3) Army (ROTC) achievement, 4) adjustment to meet the daily demands in character, social and general culture.

Rex E. Robinson Award. A statuette presented to the student most distinguished in forensics.

Grants

The Educational Opportunity Grants Program, authorized by the Higher Education Act of 1965, provides that the University can award an educational opportunity grant to students of exceptional financial need. The University can grant to a student for each academic year, during which he is in need of grant aid to pursue his course of study, an amount not in excess of $1000. Freshmen who are selected for the grants must be enrolled as full-time students and judged capable of finishing a college degree. A student already attending Utah State must be in good standing and attending full time. The student should not, but for a grant, be financially able to pursue a course of study at USU.

Loans

Long-Term Loans. An extensive loan program to assist students of limited financial means is supervised by the Office of Student Services. Utah State University is affiliated with the National Defense Education loan program. To qualify, a student must be enrolled or have been accepted for enrollment as a full-time student working toward a degree and must prove scholastic ability by maintaining a good academic standing. He must be in need of the amount of the loan to pursue the course of study.

Undergraduate students may borrow up to $1,000 a year, to a total of not more than $5,000. Graduate students may borrow $2,500 per year, up to $10,000. The total maximum loan to anyone during undergraduate and graduate study is $10,000.

Under the program, repayment of principal and three percent interest begins when the student has ceased his course of study.

Under the Higher Education Amendments of 1966, the total NDEA loan and the interest thereon may be canceled or "forgiven" at the rate of 15 percent

for each complete academic year if the borrower serves as a full-time teacher of handicapped children (mentally retarded, hard of hearing, deaf, speech impaired, visually handicapped, seriously emotionally disturbed, or who have some other health impairment that puts them in need of special education). Upon completion of seven years of teaching, the loan would be fully canceled.

Application forms for these long-term, low-interest loans may be obtained in Main 102.

Short-Term Loans. It is the desire of USU that no student fail to complete school because of some temporary financial limitation. As a phase of the program of financial aid to students, small, short-term loans are made available on a business-like basis in Main 102. Personal qualifications and need for financial assistance are the principal criteria.

Except in cases of extreme emergency no loans will be made during the last two weeks of any quarter, or a period of time exceeding the academic school year.

The total Student Loan Fund is composed of the following individual loan funds generously contributed by friends of USU.

Clyde Foundation Loan Fund. See office of Student Services for details.

USU Faculty Women's League. A loan fund for women students. Loans may range from $25 to $250. Preference is given to Senior students.

USU Faculty Women's League Revolving Loan Fund. A loan fund which provides for short-time loans, not to exceed $20, to women students for emergency purposes.

Senior Loan Fund. A gift of the class of 1911, and added to by the class of 1922, has helped many students complete school.

Rotary Club Senior Loan Fund. The Logan Rotary Club has provided a special loan fund to assist students in meeting expenses during their Senior year.

Robert L. Judd Loan Fund. This loan fund was given by Mrs. Judd in honor of her late husband. Loans are available to undergraduate men who have ability and need financial assistance.

W. B. Rice Memorial Loan Fund. This loan fund provides loans up to $200, usually for one year, to deserving students in the College of Natural Resources. Application is made to the dean's office.

Bureau of Land Management Loan Fund. This provides loans up to $100 to deserving students in the College of Natural Resources. Application should be made to the dean's office.

Marjorie Paulsen Loan Fund. A fund provided by the father of a former Aggie student active in studentbody affairs.

Ichel Water Loan Fund. An individual gift to assist students in need.

J. Reuben Clark Small Loan Fund. A reserve specifically provided for assistance to students in meeting school obligations.

O. W. Israelsen Loan Fund. This loan fund is available to Senior Engineering students only. Application is made in the College of Engineering.

Harold R. Kepner Loan Fund. A fund established in memory of Professor Harold R. Kepner by his students and friends. Available through the general loan funds of the University.

Eugene Santschi Loan Fund. A fund established in memory of Eugene Santschi. The applications may be made through the NDEA Loan Fund of the University.

John P. Holmgren Loan Fund. A fund established in memory of John P. Holmgren. The applications may be made through the NDEA Loan Fund of the University.

Frischknecht Memorial Fund. A fund established in memory of Dr. Carl O. Frischknecht and his wife Geniel Lund Frischknecht by friends, associates, and members of the family to assist students in the College of Agriculture who are in need of financial assistance. Applications should be made through the dean of the College of Agriculture.

Placement Center

Placement. The primary function of the Placement Center is to provide assistance to Seniors and graduate students in their search for suitable career positions. Representatives of business,

industry, government, and educational institutions are invited to campus to interview graduating students.

Information on job opportunities are provided. Brochures of employers are made available to explain career opportunities. Copies of student credentials are maintained and furnished to prospective employers.

The University has membership in the Rocky Mountain and Western College Placement Association and through these regional associations has representation on the national College Placement Council. This affiliation provides our graduates ready access to a nation-wide computerized placement service and a comprehensive directory of career information from business, industry and government.

Student Employment. Help is provided to University students seeking summer jobs and part-time employment while attending school. A primary objective of the office is to help students become more effective in their search for work.

Many students are successful in finding a wide variety of part-time employment in offices, laboratories, buildings and grounds, and in the downtown and surrounding communities. Skills and experience are most important in determining whether the student's services will be used.

Departments of the University hire students directly and often give priority to those enrolled in their own departments. Since they do not usually list student openings with the employment office, it is helpful for the student to get personally acquainted with work supervisors in areas where they would like to be employed.

Applications are not requested in advance, nor is it beneficial for a student to apply before he is actually in Logan and available for work. Employers are reluctant to employ students they have not met. For this and other reasons, the University does not make a job guarantee or commitment to any student in advance of his arrival at the University.

Jobs are available under the College Work-Study Program for academically qualified undergraduate students from low income families who must have financial assistance to pay college expenses. Applications for this program are requested in advance and may be obtained through the Financial Aids Office, Student Services, Main 102. Job assignments under this program are made by the Placement Center.

An undergraduate student may not work more than 90 hours per month in University employment while school is in session. Students employed on assistantships are not eligible for work on an hourly basis without the approval of the President.

The employment of foreign students and their departments on or off campus is restricted by regulation of the U.S. Immigration and Naturalization Service. Generally foreign students are not permitted to compete with qualified U.S. citizens for available positions. Approval of the Foreign Student Adviser is required and may be given after an employer certifies in writing that no qualified U.S. citizen is available who will accept the employment offered.

Counseling

Because students are faced with many problems throughout their university career, the services of

a staff of professional counselors are available to help students learn more about and better understand their own abilities, interests, personalities and emotions. These counselors assist students with their progress in college and with problems related to university life.

The Student Counseling Service, Main 101, offers specialized counseling and testing services to students who wish to learn more about themselves or who have personal problems which they would like to discuss with a professional counselor. Many of our University students have talked at some time with a counselor about educational problems, vocations they are considering, problems they have with study skills or personal situations involving dating, engagements, marriage or family relations.

A file of current information about occupations is also available to students. Students may use this information to investigate and appraise occupations in which they have an interest.

A close relationship with community and state agencies is maintained, so that whenever a counselor feels that a student might profit from these services an appropriate referral is made available.

Health

A health service is provided for all registered students on the campus. The Student Health Service is located in the basement of the University Center. The staff consists of one full-time physician, two registered nurses, a registered sanitarian, and a receptionist. All Freshmen and transfer students are required to complete the Medical Examination Record and return it directly to the Office of Admissions and Records before a permit to register will be issued. Whenever possible the Medical Examination Record should be completed by the family physician.

University officials strongly urge students to purchase the Voluntary Student Accident and Sickness Insurance available to them at the time of registration. Included in the services available at the Student Health Service are medical and surgical care for minor illnesses and injuries, inoculations and immunizations, and limited laboratory facilities. Services not included are hospital care for non-emergency conditions, X-ray examinations or special prescriptions. Students not covered by personal or group insurance should not be without the student insurance.

In case of illness or emergency during office hours, students should notify or go directly to the Student Health Service. After office hours the student may call his private physician or the Logan LDS Hospital. If the student is unable to go to the hospital, he may call 752-2050 and a doctor will be recommended.

Medical care at the Student Health Service is free. Any further medical care beyond that provided at the service must be paid for by the student or his insurance plan.

The Student Health Service is open from 8 a.m. to 5 p.m. Monday through Friday. Telephone: 752-4100, Ext. 7118.

Orientation

A program of activities has been designed to acquaint students with the life and environment of the university community. Participation in these orientation activities is required of all new

students at the beginning of each quarter. In addition to group meetings for instruction in traditions, policies and procedures, there are opportunities for preregistration interviews with faculty and administrative personnel. Entertainment through movies, dances, mixers, and game rooms of the University Center all reflect the many purposes for which this program is established.

At the beginning of each academic quarter each new student in the University who has not completed a full year of Freshman English, and who has less than 96 credits, is required to have the results of the American College Testing Program Examination (ACT) on file with the University Counseling and Testing Service. The results are used by faculty and counselors to assist in placement, and as guidance aids.

Division of General Registration

The Division of General Registration is an administrative-academic element maintained at USU for the enrollment of students who do not qualify for admittance into one of the eight academic colleges. The division performs many of the administrative tasks of an academic college. The primary function of the division is to assist and encourage students in the improvement of their academic standing so they may transfer from the division into an academic college of their choice. To accomplish this purpose various controls and guidance tools are used, including: 1) completion of remedial courses in English and Mathematics when indicated, 2) enrollment in study-skills classes, 3) limiting the number of credits carried per quarter, 4) frequent scheduled meetings with an adviser or supervisor.

The office of the Supervisor, Division of General Registration, is in Room 12, Main.

Foreign Student Advisement

Students from outside the United States are provided assistance for those problems related to immigration status and procedures through the office of Foreign Student Adviser. Assistance is also offered in personal and academic matters through all of the offices of Student Services. All students from abroad must register with the Foreign Student Adviser at the beginning of each quarter and must keep him informed concerning such matters as local address, change in student status, acceptance of employment, etc. Requests for extension of visa, work permits, immigration certifications, and money exchange letters must be submitted through the office of the Foreign Student Adviser. Students are urged to consult frequently with the adviser and to keep him informed of their problems and special needs. The Foreign Student Office is located in Main 102-F.

Speech and Hearing Center

The Speech and Hearing Center offers limited service to University students, faculty, and individuals within the community. Under staff supervision, advanced students in training offer treatment for such disorders as stuttering, misarticulation, foreign dialect, voice problems, and speech or language disorders resulting from central nervous system involvement. For enrolled University students this service is offered without charge. For others the service is on a fee for

service basis. Extensive diagnostic service is also available to all on a fee for service basis. Students or others desiring service, either diagnostic or treatment, should contact the Director of Clinical Services, Department of Communicative Disorders, second floor, Mechanical Arts Building.

Helpful Courses

Several courses are taught especially to help students with such personal affairs as marriage, food, clothing and finance. The description of the courses is found in the departments offering them. They include: Marriage and the American Family, FCD 120; Early Childhood, FCD, 150; Family Finance, HEM 355; Home Management, HEM 349; Principles of Nutrition, FN 122; Pattern Design and Clothing Construction, CT 110; Clothing Selection for Men, CT 115; Design in Everyday Living, CT 105.

Student Activities

Intramurals. The intramural program provides individual and team competition in badminton, basketball, golf, handball, horseshoes, pentathlon, swimming, softball, tennis, touch football, track and field, volleyball, weightlifting, winter carnival, and wrestling.

The purpose of the intramural program is to give each student unlimited opportunity for leadership, development of skills, sportsmanship, and good wholesome use of leisure time.

Musicals. Performances are given by band, orchestra, choral groups, and music clubs. These organizations present several concerts and recitals during the year, and participate in tours to the surrounding area.

Theatricals. Numerous productions are staged each year by student groups. Students participate in the lighting, staging, directing and managing, as well as the acting.

Debating and Public Speaking. The University is a member of the Rocky Mountain Forensic League, and each year meets schools of this group in discussion. Participation in debate tournaments in the Intermountain and Pacific Coast Region provides opportunity for experience in tournament debating. Utah State is noted for its Mid-Winter Speech Meet.

Student Publications. Students publish a thrice-weekly newspaper, **Student Life**; a yearbook, **The Buzzer**; a literary magazine, **Crucible,** and **Clue,** the Freshman orientation handbook. **Blue Book,** the official student handbook, which contains the **Student Directory,** is available to all regularly registered students. Some campus organizations sponsor publications of their own.

Radio. The University owns and operates radio station KUSU-FM, which provides broadcast services available to students and the public, and provides participation opportunities in broadcasting for qualified students registered in any course of study in the University.

KUSU-FM is managed by a staff member of the Radio-Television Department, but all department heads and operating staff positions are open to qualified students whose academic standing permits participation in extracurricular activities. KUSU-FM broadcasts ten hours per day during regular school periods.

KUSU-FM is under the direction of the Chairman of the University Radio-Television Department. Students interested in par-

ticipating in these University broadcasting services should apply to that office.

Utah State University Program Center. The University Program Center exists to provide various types of programs to groups on and off campus. It is designed especially to encourage and assist students in the development of their talents and to arrange these talents, vocal, instrumental, dramatic, dance or whatever, into programs. In this effort the center works hand in hand with Student Productions, a student programming organization. Students may apply for membership in one of the center's many departments, including assemblies, traveling assemblies, public affairs assemblies, civic programming, talent development, publicity, production, varsity show, student speakers and technical arrangements, or students may audition for performance opportunities.

Center programs travel throughout the Intermountain West, appearing before conventions, church and civic meetings, and area high schools and colleges. The center is directed by the program director. Offices are maintained in the University Center.

Program requests should be directed to the University Program Center, University Center, Room 318.

University Center Student Activity Board. The purpose of the University Center Student Activity Board is to provide students with the opportunity to plan and present activities and events which they would enjoy and to help develop their talents, creative abilities and leadership traits.

All students are encouraged to apply for membership in one of the following educational, cultural, recreational, or social areas: dance (plans studentbody evening and matinee dances); recreation (arranges campus tournaments, winter carnival, intercollegiate competitions, and professional exhibitions); photographer (records student activities on film, sponsors photo displays and exhibits); gallery (schedules and displays exhibitions of paintings, prints, ceramics, sculpturing, and photographs of both local and national artists); hospitality (members serve as receptionists for campus visitors, as hosts of teas and receptions, and as tour guides); movies (sponsors campus-wide entertainment movies); lecture and forum (sponsors speakers, panels and groups to discuss current events to keep students up to date on current issues); special events (sponsors all UC programs of a special nature); world culture (provides for displays and programs related to the varied cultural backgrounds of students enrolled at the University). Applications are accepted in the University Center at the Activity Center.

Student Government

Associated Students. All students of Utah State University, upon payment of student activity fees, become members and are therefore entitled to participate in and attend all activities sponsored by the Association. Athletic events, musicals, dramas, dances, lyceums, etc., are events to which members of the ASUSU are admitted by activity card.

The Executive Council consists of nine elected major officers of Associated Students: president, administrative vice president, social vice president, financial vice president, public relations vice president, academic vice presi-

dent, athletic vice president, organization vice president, and executive secretary. The council plays a major role in directing all student-conducted activities on the campus.

The Student Academic Senate is a composite of elected senators from each academic college. The ASUSU Academic Vice President serves as chairman of the senate. The senate initiates policies that deal with the academic environment at the University. The individual senators from each college preside also, along with the deans of their respective college, over a college council which meets reguarly to discuss academic recommendations pertaining to their own college.

Associated Women Students. Every woman student properly registered and enrolled at the University is a member of AWS. This organization fosters interest and participation in campus activities. It is governed by its own elected officers and board.

Governing Boards and Councils. The following boards and councils, composed of students and faculty supervisors, plan various campus activities: Women's Intramural Association, Men's Intramural Association, Athletic Council, Publications Council, Fine Arts Committee, University Center Student Activity Board, Student Productions, Panhellenic Council, Inter-Fraternity Council, Independent Student Council, and Inter-Residence Council.

Student Organizations

Agriculture. College of Agriculture Advisory Council, Ag Economics Club, Alpha Tau Alpha, Alpha Zeta, Dairy Club, 4-H Leaders Club, Pre-Vet Club, Rodeo Club, Animal Science Club, Plant Science Club, Food Science Club.

Business. Alpha Kappa Psi.

Chemistry. American Chemical Society.

Education. Phi Kappa Delta, Student Education Association, Utah State Education Association, Industrial Educators Club.

Engineering. Engineering Council, American Society of Civil Engineers; American Welding Society, Industrial Educators Association; Sigma Tau, Society of Automotive Engineers, Flying Techs, Institute of Electrical Engineers and Electronic Engineers, Theta Tau, American Society of Tool and Manufacturing Engineers, American Society of Mechanical Engineers.

Forestry. Foresters' Club, Forestry Wives, Xi Sigma Pi, Forest, Range, and Wildlife Society, Student Chapter of Range Society.

Geology. Geology Club.

History. Phi Alpha Theta.

Home Economics. Phi Upsilon Omicron, Zeta Upsilon Club, American Institute of Interior Design.

Landscape Architecture. Landscape Architecture Club, Student Chapter of the American Society of Landscape Architecture.

Military. Arnold Air Society, Pershing Rifles, Sponsors, Angel Flight, USU Rifle Team, ROTC Rifle Team.

Music. Band, Orchestra, Madrigals, University Marching Band, Varsity Band, Scotsmen Dance Band, University Opera and Chamber Orchestra, Music Educators National Conference.

Recreation. Badminton Club, Dance Club, PEMM (PE majors and minors), Swimming Club, Women's Intramural Association,

Men's Intramural Association, Aggiettes, L'arete Monter Outing Club, Soccer Club, Ski Club, Women's Extramurals.

Political Science. International Relations Club, Pi Sigma Alpha, Pre-Law Club.

Pre-Med. Alpha Epsilon Delta.

Psychology. Psychology Club, Psi Chi.

Sociology. Sociology Club.

Speech and Drama. Tau Kappa Alpha, Theta Alpha Phi, Utah State University Speech and Hearing Association.

Zoology. Utazoa Club.

Fraternities, Social. Alpha Gamma Rho, Phi Gamma Delta, Pi Kappa Alpha, Sigma Alpha Epsilon, Sigma Chi, Sigma Nu, Sigma Phi Epsilon.

Sororities, Social. Alpha Chi Omega, Chi Omega, Delta Delta Delta, Kappa Delta.

Recognition and Honorary. Alpha Sigma Nu, Alpha Zeta, American Student Academy, Arnold Air Society, Pershing Rifles, Phi Alpha Theta, Mortar Board, Sigma Tau, Xi Sigma Pi.

Regional. Iranian Student Association, Association of Chinese Students, Canadian Club, Arab Student Association, Dixie Club, Indian Students Association, Pakistan Student Association, Korean Student Association, Latin American Student Association, Moslem Student Association, Thailand Student Association.

Religious. Baptist Student Union, Campus Christian Fellowship (CCF), Delta Phi Kappa, Lutheran Student Fellowship, Newman Club, Westminster Fellowship, Moslem Student Association, LDS Student Association.

Scholarship. Alpha Lambda Delta, Phi Alpha Theta, Phi Eta Sigma, Sigma Tau, Phi Kappa Phi.

Service. Blue Key, Angel Flight, Aggiettes, Intercollegiate Knights, Sponsors, Spurs, Schon, Orchesis, Forward USU Forum, International-Coordination Council, Student Tutor Society.

Miscellaneous Social. International Club, Human Relations Club, Independent Students Association, Ham Radio Club, India Student Association, Inter-Residence Council.

INTERCOLLEGIATE ATHLETICS

Department of

Intercollegiate Athletics

Director Frank Williams
Assistant Director Norvel Hansen
Football Chuck Mills, Head Coach; Steve Bernstein, Jesse Cone, Jeff Fries, Garth Hall, Sid Lane, Dewey Wade, Cliff Yoshida
Basketball LaDell Andersen, Head Coach; Gordon Belnap, Dale Brown
Golf Dean Candland
Tennis Gordon Belnap
Track Ralph Maughan
Wrestling Robert Carlson
Sports Editor Kenneth D. Mitchell
Ticket Manager Tom Moulton
Trainer Richard Melhart
Equipment Manager Ken Seamons

USU's Intercollegiate Athletics is organized under the rules and bylaws of the National Collegiate Athletic Association, and of Utah State University.

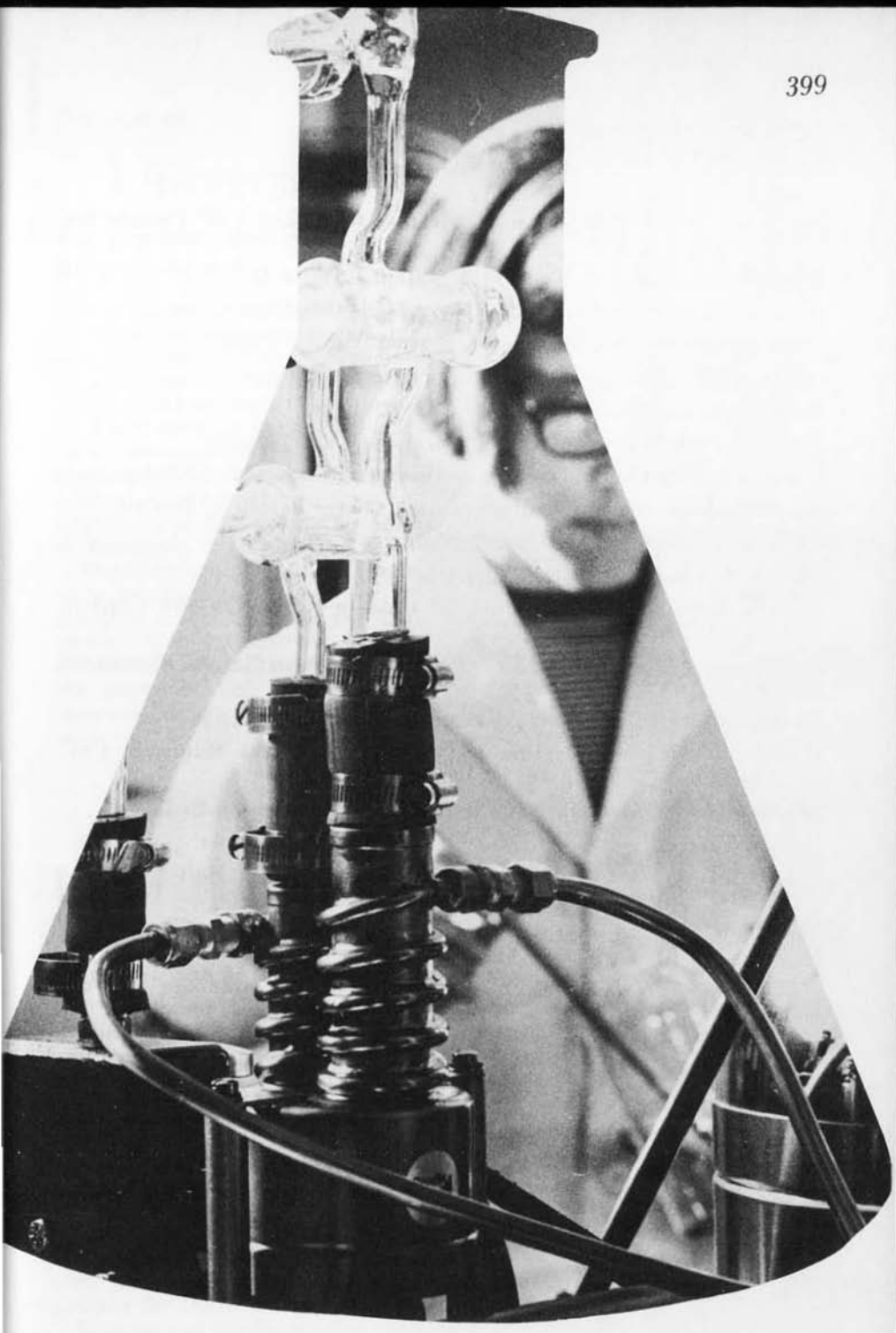
Participation. Varsity teams at USU schedule in the university division of the NCAA. Teams compete on a national and regional basis. Fall quarter participation includes football, cross country, golf, and tennis. Winter Quarter participation is in basketball, wrestling, and indoor track. Spring Quarter is spring football, track, golf and tennis. Qualifiers in any of these sports may represent USU in NCAA post-season activity.

Facilities. Excellent new facilities are enjoyed in all sports. Romney Stadium seats 20,000 for football crowds. Basketball is played in the 10,200 chair seat USU Assembly Center, and the George Nelson Fieldhouse is open for year-round use for the preparation of individuals or team members in football, basketball, golf, tennis, wrestling, track. The golf course near the campus is open for team members fall and spring seasons. Skiing facilities are only 30 minutes away.

Registration and Eligibility. All male students at USU are encouraged to participate in the various varsity and freshman intercollegiate activities. Registration for participation may be accomplished by contacting any of the coaches or registering for the class work listed in the registration bulletin. Eligibility for participation is governed by rules and regulations established by the National Collegiate Athletic Association and by the faculty senate of the University.

Awards and Grants-In-Aid. USU offers awards and grants-in-aid in all sports for athletic excellence. A student or prospective student desiring consideration for one of these awards may contact one of the coaches for further application. Any awards granted will fulfill the arrangement between the coach and recipient with approval of the Scholarship Committee.

Supervision. Supervision and direction of athletics for men is vested in the Director of Athletics and the Athletic Council, consisting of the President of the University, members of the faculty, the alumni, and student organizations.



RESEARCH PROGRAMS

Research Programs

Vice President for Research; Chairman of the Board, USU Foundation D. Wynne Thorne

Director, Agricultural Experiment Station K. W. Hill

Director, Center for Aeronomy Research Clayton Clark

Director, Engineering Experiment Station Clayton Clark

Director, Electro-Dynamics Laboratory Doran J. Baker

Director, Space Science Laboratory Kay D. Baker

Director, Utah Water Research Laboratory Jay M. Bagley

Chairman, Utah Center for Water Resources Research D. F. Peterson

Associate Director, Economics Research Center Bartell C. Jensen

Director, Ecology Center John M. Neuhold

Director, Computer Center Wendell L. Pope

Chairman, Institute for the Study of Outdoor Recreation and Tourism John D. Hunt

Chairman, Institute for Social Science Research on Natural Resources Wade H. Andrews

Chairman, Bureau of Educational Research James P. Shaver

Director, Office of Program Development; General Manager, USU Foundation E. Paul Hullinger

Leader, Utah Cooperative Wildlife Research Unit Jessop B. Low

Leader, Utah Cooperative Fishery Unit Robert H. Kramer

Leader, Utah Cooperative Forest Recreation Research Unit Phillip Barker

Director, Bureau of Government and Opinion Research J. A. Emenhiser

USU was among the first of the colleges and universities in the intermountain area to have research programs. Originally these were principally in agriculture. Now research programs are in every college and almost every department of the University.

Research is closely associated with teaching and student activities. It is conducted primarily by staff members who are also employed to teach part time. Many students, both graduate and undergraduate, are employed to assist in research. The experience thus gained by students is an important part of their education.

Research affiliated with the University is under the general administration of the Vice President for Research. Actual research programs are in several organizations. The principal organizations and areas of research are as follows:

Division of

University Research

Vice President, Research D. Wynne Thorne
Office in Main 127

It is the policy of the University to encourage and support research and all forms of creative, scholarly activities by staff members. Much of the research is supported by funds directly assigned to various administrative units of the University. Unrestricted funds for general support of research are administered through the Division of Research.

The Division of Research serves as a coordinating center for all research associated with the University. General policies and procedures pertaining to research and the promotion of a coordinated research program is the responsibility of the University Research Council. Council members and the college or division each represents are as follows: D. Wynne Thorne, Chairman; R. Gaurth Hansen, Eldon J. Gardner, Ex-Officio Members; Vearl R. Smith, Agriculture; Gary Hansen, Business; James P. Shaver, Education; Clayton Clark, Engineering; Phyllis Snow, Family Life; Wade H. Andrews, Humanities, Arts, Social Sciences; F. H. Wagner, Natural Resources; Ralph M. Johnson, Science; Kenneth W. Hill, Agricutural Experiment Station; Jay M. Bagley, Utah Water Research Laboratory; Doran J. Baker, Electro-Dynamics Laboratory, and John M. Neuhold, Ecology Center.

USU Foundation

Chairman of the Board Dean F. Peterson
Vice Chairman of the Board J. D. Emenhiser
General Manager E. Paul Hullinger
Office in Main 127

The purpose of this non-profit corporation organized in 1966 as an affiliate of USU is to assist in the development of the University as an educational and research center. The foundation is authorized to administer special contracts for research, education, and technical and scientific services, and to develop and manage patents for the University.

Directors of the foundation are: Dee A. Broadbent, JeDon A. Emenhiser, C. Anthon Ernstrom, Beverly Kumpfer, Dean F. Peterson, W. M. Robins, Glen L. Taggart, D. Wynne Thorne, and Ralph M. Johnson. The secretary-treasurer is George Allen. Members of the foundation review program activities and elect four of the directors. Members are drawn to represent the several college divisions and the Institutional Council of the University.

Agricultural Experiment Station

Director K. W. Hill
Assistant Director C. Elmer Clark
Office in Agricultural Science 225A

The Agricultural Experiment Station is a major division of the University. It was established in 1888 when the territorial legislature passed a bill creating Utah Agricultural College and Utah Agricultural Experiment Station. It is commissioned by state and federal legislative acts to conduct the research needed to conserve and manage natural resources, to produce and prepare food and fiber, and to develop and improve rural homes and rural living.

The investigations needed to fulfill Experiment Station responsibilities involve the full- or part-time services of about 130 professional staff members associated with 19 departments of the University. The staff includes about 60 employees of the U.S. Department of Agriculture who are assigned to collaborate in agricultural research activities. A large number of undergraduate and graduate students are employed on a part-time basis to assist with the studies.

The Experiment Station investigations are organized into about 190 research projects. Investigations range from applied field tests to fundamental research under controlled laboratory conditions.

Station research is periodically reviewed by advisory committees representing every segment of the agricultural industry. These committees evaluate the progress of research efforts and recommend problems in need of further study.

Most of the research laboratories used by the Experiment Station are also on the campus, distributed among the various University buildings.

Center for

Research in Aeronomy

Chairman of the Council Ralph M. Johnson
Council Members Dean F. Peterson, Farrell Edwards
Director Clayton Clark
Assistant Director Kay D. Baker
Scientific Adviser Lawrence R. Megill
Office in Engineering C216

The Center for Research in Aeronomy (upper atmospheric sciences) serves as a focus for research in Aeronomy carried out by staff members in the Departments of Chemistry, Physics, Soils and Meteorology, Electrical Engineering, Mechanical Engineering, the Electro-Dynamics Laboratories, and the Engineering Experiment Station. Students may do research work for theses and dis-

sertations under the direction of one of 27 faculty members affiliated with the center. Degrees are awarded by the associated departments.

The goals of the center are:

1) To provide a structure, both administrative and physical, with which scientists and engineers from many departments and colleges may share their common interests and capabilities in aeronomy.

2) To attract qualified faculty and students to USU.

3) To train graduate students.

4) To contribute to knowledge through research and the publication of scientific papers.

5) To promote cooperative efforts with the aerospace industrial community.

The Space Science Laboratory, directed by Dr. Kay D. Baker, is a division of the Center for Research in Aeronomy. SSL has an extensive program in upper air research. (See the Space Science Laboratory description.)

The center cooperates with the Electro - Dynamics Laboratories and other campus research units in shared research programs in atmospheric sciences.

Engineering Experiment Station

Dean, College of Engineering Dean F. Peterson
Director, Engineering Experiment Station Clayton Clark
Associate Director Reynold K. Watkins
Office in Engineering C216

The Engineering Experiment Station is a major part of the College of Engineering. It has a broad purpose of furthering engineering sciences, engineering arts, and engineering education.

Faculty members of the College of Engineering are members of the Engineering Experiment Station. They may be employed full or part time on research.

The station conducts basic and applied research in Civil, Electrical, Mechanical, Tool and Manufacturing, Irrigation and Agricultural Engineering, as well as in Industrial and Technical Education. Results of these studies are published in research bulletins, in engineering reports and papers, or otherwise made available to those interested.

In addition to the regular academic laboratories and facilities, the Engineering Experiment Station has the following specialized research laboratories and institutes under the supervision of the senior research staff as noted. Projects under these laboratories are financed by federal grants, Utah Mineral Lease Funds, and industry.

Antenna and Radio Propagation Laboratory: Romney D. Harris, Alan W. Shaw, Alvin M. Despain, Glen H. Smerage, Clayton Clark

Buried Structures Laboratory: Irving S. Dunn, Fred Kiefer, Alma P. Moser, A. B. Smith, R. K. Watkins

Control and Simulation Laboratory: Bruce O. Watkins

Cryogenics and Heat Transfer Laboratory: Russell M. Holdredge

Electroacoustic Laboratory: Larry S. Cole, Clayton Clark

Fluid Mechanics and Gas Dynamics Laboratory: Calvin Clyde, Gary Z. Watters, Roland W. Jeppson

Magneto-Plasma Dynamics Laboratory: Edward W. Vendell, Ronney D. Harris, Alvin M. Despain, Bertis L. Embry, William Fletcher

Solid State Electronics Laboratory: William L. Jones, Alan W. Shaw

Structural Engineering and Mechanics Laboratory: Winfred O. Carter, Alma P. Moser, Elliot Rich, Vance T. Christiansen

Structural Materials Research Laboratory: William Cordon, J. Derle Thorpe

Technical Education Research Institute: Austin G. Loveless, William E. Mortimer

Transportation Safety Laboratory: Richard G. Swapp, R. K. Watkins, and others

Electro-Dynamics Laboratories

Dean, College of Engineering Dean F. Peterson

Director, Electro-Dynamics Laboratories Doran J. Baker

Assistant Director Alvin M. Despain

Research Engineers Melvin F. Eckman, D. Gary Frodsham, Ralph H. Haycock, Ronald J. Huppi, Larry L. Jensen, Larry R. Smith, Allan J. Steed

Research Scientists Ralph D. Briscoe, Gary W. Lindberg

Office in Engineering L-266

The Electro-Dynamics Laboratories perform research studies with an emphasis on aerospace electromagnetic radiation phenomena. The staff consists primarily of faculty and students in Engineering and Science. The research projects and programs are tied closely into the graduate program of the University. Most of the operating funds are obtained from federal grants and contracts.

Electro-Optical Engineering. Advanced techniques for the detection, measurement, and analysis of ultraviolet, visible and infrared radiant energy are being studied and developed. Modern concepts in Fourier optics, communication theory, statistical detector theory, cryogenics and solid-state electronics are brought to bear in a multidisciplinary effort. Advanced instrumentation has been developed for upper atmospheric and space measurements including interferometer-spectrometers, dispersion spectrometers, photometers, and helium-cooled radiometers.

Atmospheric Studies. Experimental and computer-aided theoretical studies are conducted in concert with the Center for Research in Aeronomy. Rocket-borne instruments are used for *in situ* measurements of auroras and upper atmospheric airglow. Field measurements of the atmospheric environment are also made from fixed, mobile, and aircraft observatories. A major program of computer-aided analysis, design and optimization facilitates both the

experimental and theoretical programs.

Information and Data Systems Research. Innovative systems are investigated and developed for the acquisition, storage, retrieval, communication and processing of information derived from physical systems. Digital and analog techniques are applied both to experimental data and to on-line systems. Extensive use is made of computers and special purpose digital systems.

Stewart Radiance Laboratory. This laboratory is primarily involved in the field study of auroral and airglow phenomena on a global scale. Engineers at the laboratory are making detailed measurements in the infrared using cryogenic interferometer-spectrometers and radiometers aboard a high-altitude jet aircraft.

Space Science Laboratory

Director, Center for Research in Aeronomy Clayton Clark
Director, Space Science Laboratory Kay D. Baker
Office in Engineering C216

The Space Science Laboratory, a division of the Center for Research in Aeronomy, is comprised of scientists, engineers, supporting professional personnel, and student research assitants working together in research programs directed toward achieving a more complete understanding of earth's atmospheric and solar-terrestrial relationships.

Experimental research programs are conducted in conjunction with atmospheric disturbances such as auroral events, polar cap absorption, solar eclipse, and sudden ionospheric disturbances.

Instrumented rockets, satellites and aircraft are utilized to measure the excitation sources associated with these events and the resulting effects upon the earth's atmosphere. A major area of emphasis at the laboratory has been the development and exploitation of the remote measurement techniques employed extensively on these payloads with great success.

The diversified research programs afford an opportunity to bring many academic disciplines together in the solution of problems of both practical and theoretical nature. They also provide excellent opportunities for graduate and undergraduate study in that a student may be granted a degree in a closely related department such as Electrical Engineering or Physics while conducting his research and gaining valuable experience in the Space Science Laboratory.

Utah Water Research Laboratory

Dean, College of Engineering Dean F. Peterson
Director, Utah Water Research Laboratory Jay M. Bagley
Assistant Director Calvin G. Clyde
Office in Water Laboratory

The Utah Water Research Laboratory is one of the finest of its kind in the country. It provides 80,000 square feet of space planned for efficient and highly flexible use.

Physical Facilities. The laboratory contains a variety of flumes and channels for conducting research in hydraulics and fluid mechanics.

In addition to the hydraulic facilities, the laboratory contains a specialized water quality laboratory, including modern equipment and instruments for performing a wide variety of biological, chemical and physical water quality analysis. Water pollution control and aspects of sanitary engineering comprise an important segment of the research program of the laboratory.

Special laboratories are maintained for the development, testing, and maintenance of instrumentation essential to the precise measurement of many hydraulic, hydrologic, and climatic elements. Electronic devices are being developed for telemetering watershed information to a central headquarters, remote sensing of hydrologic phenomenon, measurements of fluid flow phenomenon (both air and water), and many other applications.

Scope of Research Activity. The laboratory serves as the research arm to many agencies that encounter water problems. It conducts research on a wide variety of water problems affecting agricultural, municipal, industrial and recreational users of water. Both basic and applied research are stressed.

Some 40 research projects are underway under such broad categories as weather modification, geohydraulics of mountain streams, consumptive use and water requirements mechanics of overland flow, hydrologic simulation by digital and analog computers, movement of water into and through soils, optimizing uses of surface and groundwater, hydraulic structures and measuring devices, water resource inventories, water resource planning methodology, hydro-climate summaries, quality standards for water, water quality management and pollution control.

Academic Cooperation and Support. The research staff of the Utah Water Research Laboratory represents a wide spectrum of Water Science and Engineering specialties. These include Fluid Mechanics and Hydraulics, Sanitary Engineering, Hydrology, Chemistry, Microbiology, Meteorology, Water Resource Planning and Management, Electronics, Applied Mathematics and other fields. Of the 34 professional staff presently employed, 22 hold joint appointments with academic departments. Many of the research projects are interdisciplinary in nature. Current research projects involve cooperation with staff from 10 different academic departments.

Research provides opportunity for graduate research assistantships and part-time student employment. Many graduate theses and dissertations are supported by laboratory research projects.

Utah Center for

Water Resources Research

Chairman Dean F. Peterson
Council Members Thadis W. Box, K. W. Hill, Ralph M. Johnson, Jay M. Bagley, Vearl R. Smith, D. Wynne Thorne
Executive Secretary William I. Palmer

Purposes of the Utah Center for Water Resources Research are:

1) To coordinate University-wide research in the field of water resources as described by "The Water Resources Research Act of 1964."

2) To administer the provisions of the Water Resources Research Act as they relate to USU and the state of Utah.

3) To encourage and foster the development of interdepartmental research and educational programs to the water resources field.

All University staff members and collaborators engaged in water resources education or research are associates of the center. The center encourages development of instructional programs that will further the training of water resource scientists and engineers. The center implements programs related to water resources research in education both on and off the campus. It maintains liaison relationships with appropriate state, national and international organizations and agencies having similar objectives, including the Universities Council on Water Resources. It is cognizant of the total program of water resources research of the University and its relationship to the activities of state and federal agencies and communities and conducts seminars on various aspects of water resources research needs.

Economics Research Center

Associate Director Bartell C. Jensen
Office in Agricultural Science 230

This is a research organization that promotes and coordinates research on economic and related problems. The center serves as a clearing house for ideas and methods related to research on economic and related problems. It provides leadership in planning and conducting research and gives assistance to staff members in seeking financial support from other agencies interested in supporting research related to economic problems.

Membership in the center is voluntary and limited to USU staff members conducting re-

search in economics or related fields. Associate membership in the center is open to staff members interested in seminars and other activities sponsored by the center but who are not leaders in center-sponsored research projects.

The director of the center is administratively responsible to the deans of the Colleges of Agriculture and Business.

Ecology Center

Director John M. Neuhold
Office in Forestry-Zoology 217

The Ecology Center was established to promote and coordinate research and graduate study in the area of ecology. The center was created at the request of and includes the Colleges of Agriculture, Natural Resources, and Science, and the Departments of Bacteriology, Botany, Forest Science, Geology, Plant Science, Range Science, Soils and Meteorology, Wildlife Resources and Zoology. These departments are currently engaged in ecology research or training.

The creation of the Ecology Center recognizes that ecology is multidisciplinary requiring the coordination of biology and earth science programs. The objectives of the center are:

1) To coordinate ecological research.

2) To coordinate course instruction and graduate training in ecology.

3) To provide an interdisciplinary focal point for graduate majors in ecology.

The center currently has 47 active associates engaged in some form of ecology research or training, ranging from the aquatic to the terrestrial and including supporting areas. Much of the research and graduate training takes place on the USU campus. The entire northern third of the state of Utah provides the proximal outdoor laboratory. This laboratory includes such facilities as the Bear Lake Biology Laboratory, the USU school forest and its supporting facilities, the Green Canyon Ecology Compound, the Logan River Biology Laboratories, and the Northern Desert Ecology Laboratory. A wide variety of ecological types, ranging from the alpine to salt desert and both aquatic and terrestrial communities, are involved.

Computer Center

Director Wendell L. Pope
Assistant Director Karl Fugal
Office in Computer Science 120

The Computer Center provides educational, research, and administrative computing and data processing services for the University community. Educational activities include computing for students in organized classes, and for graduate students and faculty members engaged in approved, non-funded research projects.

Research activities include computing for the Ecology Center, Agricultural Experiment Station, Engineering Experiment Station, Utah Water Research Laboratory, and for research projects directed by members of the faculty and requiring computing services.

Administrative activities include the maintenance of the University's accounting system, inventory records, payroll and salary files, and student records. The center is equipped with an IBM 360/44 with 262,144 bytes (characters) of main storage, a 2314 disk drive with 145,000,000 bytes of storage, two tape drives, a high speed printer, a card reader and a card punch.

Institute for the Study of

Outdoor Recreation and Tourism

Chairman John D. Hunt

Associate Chairman P. Richard Boyce

Office in Forestry-Zoology 159

The Institute for the Study of Outdoor Recreation and Tourism acts as a coordinating organization which brings together those members of the faculty directly concerned with recreation education, research or extension work.

The institute is charged with the following areas of responsibility:

1) To promote the development of high quality curricula for outdoor recreation and tourism at USU.

2) To develop a broad base for outdoor recreation and tourism research programs at USU and to serve as a vehicle for assisting University faculty in obtaining research funds.

3) To cooperate with USU Extension Services in coordinating, conducting and developing educational programs concerning outdoor recreation and tourism.

4) To cooperate with other divisions of the University conducting research or extension programs related to outdoor recreation and tourism, so that the total University accomplishments will be maximized.

Institute for Social Science Research on

Natural Resources

Dean, College of Humanities, Arts, and Social Sciences M. Judd Harmon

Chairman of Institute Wade H. Andrews

Office in TJ-14

The establishment of an Institute for Social Science Research on Natural Resources adds breadth and depth to the other extensive programs of the University related to natural resources. Such an institute is charged with the responsibility of stimulating, developing, and carrying out this work in the social sciences both within the University and with outside agencies.

Specifically the objectives include:

1) To provide for the development of research on the human aspects in natural resources by social scientists of the University.

2) To develop conferences and other public service activities.

3) To provide opportunity for student learning and necessary experience.

Bureau of Educational Research

Dean, College of Education Oral L. Ballam

Director James P. Shaver

Office in Education 412-B

The College of Education maintains a Bureau of Educational Research which serves the following functions:

1) Coordinates research activities in the College of Education. The bureau cooperates closely with the Division of University Research and the School of Graduate Studies.

2) Plans and conducts educational research.

3) Provides information and research services to Utah educational administrators.

4) Represents the college in state-wide and nation-wide cooperative educational research projects.

5) Provides guidance and research source materials to graduate students in the College of Education.

Office of

Program Development

Director E. Paul Hullinger
Office in Main 129

The Office of Program Development was established to help develop federal and private support of USU's research and training programs. The office functions as a central grant clearing house and supplies faculty members with information on sources of grant funds, as well as assisting in the preparation of proposals. Current instructions, application forms and other data are maintained for faculty use.

Utah Cooperative

Wildlife Research Unit

Leader Jessop B. Low
Assistant Leader J. Juan Spillett
Office in Forestry-Zoology 167

The Utah Cooperative Wildlife Research Unit was initiated in 1935 through a memorandum of understanding between the University, Utah Fish and Game Commission, Wildlife Management Intitute and the U.S. Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife. The unit's objectives are to:

1) Train students in wildlife management, research demonstration and administration.

2) Conduct research basic to proper utilization of wildlife and fisheries resources.

3) Promote wildlife education through demonstration, lecture, and publication.

4) Make results of investigations available to cooperators and the public.

Through the Research Unit's program in cooperation with the College of Natural Resources and the Department of Wildlife Resources, students are trained for state, regional and national positions in wildlife management, research and other phases of natural resources conservation. Students whose studies are financed through the unit program are selected from among high ranking candidates from institutions whose major training is in Fish and Wildlife Management or Biology, Zoology, Botany, Agriculture or related fields.

Emphasis is given to training in resource management in waterfowl and marshland ecology, big game habitat and populations and habitat requirements, upland game

bird ecology and habitat, fur bearing animal ecological and habitat requirements and conservation education. In addition to the regular cooperators, funding, equipment and supervision is secured from other state conservation agencies, as well as from U.S. government bureaus and departments.

Utah Cooperative

Fishery Unit

Leader Robert H. Kramer
Assistant Leader Clair B. Stalnaker
Office in Forestry-Zoology 279

A Utah Cooperative Fishery Unit was established at USU to conduct training and research in fishery science.

It was the first of 23 such units to be established in the United States.

Objectives of the program include teaching and training of fishery scientists and fishery management biologists and obtaining research related to problems of regional or national interest.

Cooperating in the unit are USU, with its Department of Wildlife Resources; the Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior; and Utah State Department of Fish and Game.

Students financed by the unit program receive graduate training for positions in fishery research, fishery administration and fishery management.

Utah Cooperative

Forest Recreation Research Unit

Leader Phillip Barker
Office in Forestry-Zoology 355

This unit was the first of four such units established in the United States. Objectives of the unit are to:

1) Train graduate students in recreation management and research.

2) Conduct and stimulate research in the biological and sociological aspects of forest recreation.

Cooperating in the unit are USU with its Department of Forest Science, and the U.S. Forest Service's Intermountain Forest and Range Experiment Station.

INTERNATIONAL PROGRAMS AND STUDIES

International Programs and Studies

Director, International Programs and Studies Bruce H. Anderson
Director, Center for the Study of the Causes of War and Conditions for Peace Daryl Chase
Project Leader, Research on Agricultural Responses to Water Management A. Alvin Bishop
Chairman, East-West Institute LeRoy A. Blaser
Director, Institute of International Affairs Wendell B. Anderson
Chief of USU Team in Bolivia B. Austin Haws
Director, Inter-American Center for Land and Water Resource Development Earl Israelsen
Head, CIDIAT Subcenter in Colombia James Hughes
Project Leader, Peace Corp Training in Iran Glen Casto
Project Leader, Peace Corp Training in Logan Gordon Porter

For more than a decade, the University has maintained strong international programs. Several hundred students from foreign lands enroll each quarter. Contracts abroad have been made with the government of the United States, Iran, Bolivia, Brazil, Venezuela and Colombia. In addition, many faculty members have been granted leaves of absence to serve in nations within the following regions: Africa, Middle East, Asia and Latin America. Utah State has provided training for Peace Corps volunteers to serve in Iran, northern Africa, Venezuela and Bolivia. International programs at USU include the following:

Center for the Study of

The Causes of War and Conditions for Peace

Board of Governors: Daryl Chase, **Director;** Roger B. Hansen, T. H. Bell, Peter W. Billings, Hugh B. Brown, Marriner S. Eccles, David W. Evans, Joseph Lennox Federal, E. Earl Hawkes, O. C. Tanner, Maurice Warshaw, Richard S. Watson; Calvin L. Rampton, Glen L. Taggart (ex-officio members)

Directorate: Daryl Chase, Milton C. Abrams, Therel R. Black, M. Judd Harmon; Gerald R. Sheratt, **Executive Secretary**

Office in Library 361B

The governing body of the center is the Board of Governors, while the directorate administers the center's programs.

The center was established to focus the attention of the academic community on the issues and ideas contained in man's age-

less search for peace. The center serves to stimulate research studies, to assemble a comprehensive library of books and periodicals relating to the causes of war and conditions for peace, to provide a meaningful dialogue between scholars and leaders in the various areas of international relations, to publish papers relating to the purposes of the center, and to utilize the processes of education to promote the peaceful ordering of human affairs.

The center sponsors an annual convocation, as well as periodic seminars and institutes. Two courses, History 509 (A Study of War and Peace) and History 621 (A Colloquium on War and Peace) are offered by the center.

Research on Agricultural Responses to

Water Management

Project Leader A. Alvin Bishop
Field Director Byron C. Palmer
Agronomist Don C. Kidman
Water Resources Engineer Komaim Unhanand
Water Rights and Legislation David Daines
Irrigation Engineering Edward C. Olsen III, Richard C. Griffin, Kern Stutler

On June 3, 1968, USU signed a contract with the U.S. Agency for International Development to conduct "Research on Agricultural Responses to Water Management in the Wet-Dry Climatic Zone of South and Central America." The general objective of this research is to increase food production in the arid and sub-humid lands of the less developed countries through the improvement of water management practices (irrigation and drainage).

Work is under way in Brazil, Chile, Colombia, Venezuela, El Salvador, and Ecuador. Other countries will be included as the program develops.

East-West Institute

Chairman LeRoy A. Blaser
Office in Main 13

The East-West Institute fosters a program of cultural exchanges and educational activities with the South and Southeast Asian nations to improve understanding between the East and West. The institute works in cooperation with private and governmental agencies in the development of student opportunities and curriculum enrichment as well as better community understanding with the primary purpose of improving international relations.

The institute has worked cooperatively with the American Association of Colleges for Teacher Education in the pilot study program of educational enrichment of international education.

Each year a well-known scholar or an authority on international relations in the Pacific region has been brought to the campus for a series of lectures and seminars to students, faculty and townspeople. This has resulted in an increasing awareness and improved understanding with our neighbors in the Pacific basin.

Institute of

International Affairs

Director Wendell B. Anderson
Office in Main 246

The Institute of International Affairs in cooperation with the Colleges of Business, and Humanities, Arts and Social Sciences, administers the program for the *Certificate in International Relations*, which is granted by the University to students who meet the University's requirements for graduation with a bachelor's degree, and includes in his curriculum not less than 40 credits with at least a 2.5 grade point average selected from designated subjects and courses preparing the student for international responsibilities and service. A brochure describing the requirement for the *Certificate in International Relations* and application forms may be obtained in Main 246.

The Institute of International Affairs represents the University in a cooperative activity with the Associated Students in selecting, training, and sponsoring a USU student delegation to the Model United Nations of the Far West held each spring at a university in the West.

The institute from time to time presents a television program, **The World and the West,** focusing on international affairs. Programs produced have been broadcast on KUSU-TV, Channel 12, and either KUED-TV, Channel 7, or KBYU-TV, Channel 11.

Contract between

USAID-USU-Bolivia

Chief of USU Team in Bolivia B. Austin Haws
Campus Coordinator Bruce H. Anderson
Forage Crops Adviser Keith R. Allred
Livestock Adviser Keith H. Hoopes
Educational Adviser Dale J. Harding
Economics Adviser Rondo A. Christensen
Extension Adviser William F. Farnsworth
Agronomist Ben L. Grover
Seed Specialist James H. Thomas

USU signed a contract to provide technical assistance as a cooperating member of the USAID Rural Development Team in Bolivia on July 19, 1965. Initially the contract provided for four USU specialists — an extension adviser, agricultural resources economist, forage specialist and livestock specialist — to serve two-year assignments in La Paz, Bolivia. Since the contract was signed, additional specialists have been added in education, cereals, water use and banking. In addition, short-term consultants from the USU faculty have assisted in such areas as community development, animal breeding, entomology and education. Included in the contract is a provision for graduate students.

Partners of the

Alliance for Progress

The University is cooperating with the Utah Committee for International Contact, a group of prominent Utah citizens, and counterpart committees in Bolivia to develop programs of mutual interest and benefit to citizens of Utah and Bolivia.

Program of

Peace Corps Training

Since 1963 USU has been engaged in the training of Peace Corps contingents for service in Bolivia, Iran, Morocco and Venezuela. Current Peace Corps-USU contracts provide for a year-round training center in Teheran, Iran, as well as Utah-based

summer training programs for volunteers going to Bolivia. In addition, a new PC/USU support contract further strengthens PC/Bolivia by lending direct technical assistance and close liaison with the USAID-USU technical assistance team in Bolivia.

Inter-American Center for

Land and Water Resource Development

Director Earl Israelsen
Assistant Director Cesar Garces
Campus Coordinator Bruce H. Anderson
University of Los Andes Jesus Rafael Boada
Administrative Assistant Bruce B. Muir
Pilot Project Leader, Colombia James H. Hughes
Professor of Irrigation and Drainage Carlos J. Grassi
Professor of Agricultural Economics Marcelo Peinado
Professor of Hydrology Roger Amisial
Professor of Soils Americo Grogman
Professor of Soil Science Juan Antonio Comerma

The Inter-American Center for Land and Water Resource Development is operated for the Organization of American States by USU in cooperation with the University of the Andes, Merida, Venezuela.

The center was established in 1965 at Merida for training Latin American leadership from the member nations of OAS in water and land resources development. The curriculum and procedures developed by the center allow maximum participation of the Latin Americans and the infusion of their background and experience into the program.

Curriculum being presented includes the philosophy of resource development; resource data collection and evaluation in terms of regional planning needs; principles and procedures of resource planning; logistics of project development, and successful project operation and management for optimum return.

The center (commonly known in Latin America as CIDIAT, the initials of the center's title in Spanish) presents this material in short courses designed for three levels of planners and implementers. Also a series of national training courses is being taught by the CIDIAT faculty in various countries on request. These involve irrigation and drainage courses, and the management and operation of irrigation districts.

Projects in

Cultural Exchange and Language Training

Since 1960 USU has conducted a variety of special programs which stress language training and cultural orientation. USU's Spring Quarter in Mexico, a program of study at the University of the Americas in Mexico City, has averaged 30 participants each year. USU's Intensive English Language Institute for foreign students, designed to train the participants in English and to orient them to American culture, was initiated in 1969. There have been 14 NDEA Language Institutes (recently called EPDA Institutes) for secondary teachers, nine of which were in Spanish and five in French. In the summers of 1965, 1967 and 1968 the Spanish Institutes were held in Oaxaca, Mexico. In its various Peace Corps projects USU has trained volunteers in French, Persian, Spanish, Quechua and Aymara.

University Publications Editors

University Editor, John J Stewart

Extension Services Editor, Christian P. Nielsen

Agricultural Experiment Station Editor, Millard E. Wilde

Utah Water Research Laboratory Editor, Donna H. Falkenborg

Alumni Association and Development Fund Editor, Gerald R. Sherratt

Sports Information Editor, Kenneth D. Mitchell

University Monograph and Western Texts Society Editor, Mary Washington

The Western Historical Quarterly **Editor,** Leonard J. Arrington

The Western Historical Quarterly **Managing Editor,** S. George Ellsworth

Space Science Laboratory Editor, Glenn D. Allred

University Research Division Writer, Lois M. Cox

Graduate News and Comment **Editor,** John Mark Sorensen

Outlook **Editor,** Clifford R. Cahoon

Staff News **Editor,** Linda E. Keith

Special Educator **Editor,** Dwayne D. Peterson

EXTENSION SERVICES

University Extension

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Associate Director C. Dennis Funk
Assistant Director, Conferences and Institutes Wayne B. Ringer
Supervisor, Extension Family Life Programs Margaret B. Merkley
Supervisor, 4-H Youth Programs Glenn T. Baird
Associate Supervisor, 4-H Youth Programs Amy R. Kearsley
Assistant Supervisor, 4-H Youth Programs Kay R. Bendixsen[1]
Area Coordinator (Provo) Marden Broadbent
Area Coordinator (Uintah Basin) Delbert C. Purnell
Area Coordinator (Cedar City) Wallace Sjoblom[1]
Area Coordinator (Richfield) Marven Ogden[1]
Coordinator-Instructor, Southeastern Utah Center, Moab Thomas K. Arnold
Staff and Community Development Leader Wesley T. Maughan
Supervisor, Training and Evaluation Stephen L. Brower[2]
Coordinator, Low Income Programs Gerald R. Olson
Coordinator, Extension Class Division and Urban Civil Defense John L. Owen
Conference and Institute Coordinators Delmar B. Faddis, Louis Griffin
Conference and Institute Program Administrator Charlene Berkey
Continuing Education Center Manager Glenn Jeppson
Controller's Representative W. Arthur Cahoon
Secretary to Vice President Libbie B. Maughan
Youth Program Assistant LaRee A. Petersen
Independent Study Program Coordinator Shirley Andreasen
Administrative Assistant, Continuing Education Lyn Grimaud
Bulletin Room Clerk Wilda Jones
Printer Bill Rich

State or Area Program Leaders

Agricultural Engineering Spencer Daines
Animal Science Clair Acord
Animal Science Norris Stenquist
Animal Science Grant M. Esplin[1]
Animal Science Nyle Matthews
Animal Science R. Morrell Mathis[1]
Clothing and Textiles Theta Johnson
Community Beautification A. Fullmer Allred
Consumer Education Helen Thackeray
Dairy Science John J. Barnard
Dairy Science George Stoddard
Entomology Reed S. Roberts
Extension Advisor, Nutrition Programs, Salt Lake County Margie Ruth Newman
Extension Economist Jay C. Anderson
Farm/Economic Adjustment Lloyd A. Clement

[1]Also doing work on county basis.
[2]On leave.

Foods/Nutrition Flora Bardwell
Food Science Dee Morgan
Forestry/Outdoor Recreation Carl Johnson
Graphic Artist L. Jay Smith
Horticulture/Landscape Improvement Melvin S. Burningham[1]
Horticulture/Landscape Improvement Joel C. Barlow[1]
Information and Publications Cleon Kotter
Information and Publications Christian P. Nielsen
Marketing Morris H. Taylor
Marketing Ray H. Finch[1]
Marketing Paul R. Grimshaw
Media Specialist Courtney Brewer[2]
Neighborhood Youth Corps Supervisor Rulon Buck[1]
Plant Science Louis A. Jensen
Poultry Science C. I. Draper
Radio-TV Arthur Higbee
Radio-TV James K. Randall
Range Management Karl G. Parker
Resource Development and Public Affairs Leon C. Michaelsen[2]
Recreation and Tourism Richard Boyce
Recreation and Tourism Larry Royer
Soil Science and Water Use Paul D. Christensen
Urban Civil Defense Rex Tueller
Veterinary Science Don W. Thomas
Water Resources Richard Griffin[2]
Water Quality Specialist Byron Palmer
Wildlife Resources Gar W. Workman

County and Area Agents

Beaver Grant M. Esplin[3]
Beaver Miriam A. Limb
Box Elder Jessie Eller
Box Elder Harold Lindsay
Box Elder Ray Finch[3]
Box Elder Rulon Buck[3]
Cache Ray Burtenshaw
Cache Bessie K. Lemon
Carbon Rell Argyle
Carbon Bernice Nelson
Davis Dorothy K. Hansen
Davis Virginia Blackburn
Davis L. Darrell Stokes
Davis W. Lloyd Smith[3]
Duchesne Mary Boender
Duchesne R. Morrell Mathis[3]
Emery Lavon Day[2]
Emery Elaine B. Hatch
Emery Earl Seeley
Ft. Duchesne Max Sudweeks[2]
Ft. Duchesne Verl Matthews
Garfield Catherine Barney
Iron Marva W. Esplin
Iron Wallace D. Sjoblom[3]
Juab Lynn Esplin
Juab Gloria P. Ludlow
Kane LeOna Swallow
Millard Beth N. Crosland
Millard Jay Hall
Millard MarGenne B. Rowley
Morgan Judith Lynnette London
Morgan W. Lloyd Smith[3]
Piute Keith Chapman[3]
Rich Helen Wamsley
Salt Lake Melvin S. Burningham[3]
Salt Lake Ruth Coates
Salt Lake Bernice Palfreyman
Salt Lake Joseph F. Parrish
Salt Lake D. Wayne Rose
San Juan Ivan Blaine Jones
San Juan William P. Lee
San Juan Niels LeRoy Martin
Sanpete Jack Herring

[1]Also doing work on county basis.
[2]On leave.
[3]Also doing work on area/state basis.

Sanpete Kay Willardson
Sevier Linda Durfee
Sevier Marven Ogden[3]
Summit Annette Vernon
Summit J. Reed Moore
Uintah Vaughn Hunsaker[3]
Utah Joel C. Barlow
Utah Paul R. Daniels[3]
Utah Robert Hassell
Utah Ralph Horne
Utah Irene G. Thomson
Wasatch Elizabeth Darley
Wasatch Paul R. Daniels[3]
Washington Don A. Huber
Washington Gwen Biddulph
Wayne Keith Chapman[3]
Wayne Carol H. Williams
Weber Fay W. Boyer
Weber Martha Burton
Weber Lee S. Rogers
Weber Ruth Tippetts

[3]Also doing work on area/state basis.

Extension Representatives with Colleges

Agriculture Doyle J. Matthews
Business Calvin D. Lowe
Education Orson Tew
Engineering Larry S. Cole
Family Life Margaret B. Merkley
Humanities, Arts and Social Sciences Glenn R. Wilde
Natural Resources J. Whitney Floyd
Science Akeley Miller

On Special Assignments

Ben W. Lindsay, Box Elder, Cache, Oneida Resource Conservation and Development Project
J. Wayne McArthur, Four Corners Commission Feasibility Study

University Extension

Office in Agricultural Science 209

University Extension includes the Cooperative Extension Service, the Conference and Institute Division, and Continuing Education, the latter encompassing the Extension Class Division, the Independent Study (correspondence-home study) Division, Uintah Basin Center, and Southeastern Utah Center (Moab).

Cooperative Extension Service

The Cooperative Extension Service is sponsored and financed jointly by federal, state and county governments. There is a Cooperative Extension Service in the landgrant institution of each state.

The main functions of the Cooperative Extension Service are: to develop leadership, resourcefulness and initiative; to supply factual information for discovering and solving problems; and to help people become more efficient, increase their income, improve their home and community environment and raise their standard of living. University Exten-

sion takes the findings of research to the people of the state and brings unsolved problems back to the research workers at the University.

Extension programs are planned with the people. The demonstration method of teaching and mass media are used extensively. Group meetings, shortcourses, and publications are used to supply educational information.

Administrative and some supervisory personnel and subject-matter program leaders are located on the USU campus. In addition, a field staff consisting of area coordinators, area specialists, area agents, county agents, home economists, and program aides serve the people in all areas of the state.

The Extension program includes work with both adults and youth.

Programs emphasized are centered around: 1) improving farm incomes, 2) soil and water conservation, 3) marketing, utilization, distribution and farm supply, 4) international programs, 5) food and nutrition, 6) pesticide education and emergency preparedness, 7) 4-H and youth development, 8) improved family living, 9) community development, 10) recreation, wildlife and natural beauty, 11) forestry production and marketing, 12) resource protection and environmental improvement.

Central in the function of University Extension is problem solving at the community level. Through research provided by the departments of the University, the community becomes the laboratory in the teaching-learning process. Community problems are extremely varied and complex. Consequently, University Extension educational programs designed to benefit the community require creativity and innovation of the colleges and departments according to their areas of competency.

To carry out this function, Extension programs of Utah State University focus on the knowledge competencies from the appropriate disciplines on four broad areas of concern to people of Utah: physical environment, social environment, economic and industrial development, and education instructional services.

Conference and Institute Division

The responsibility for conferences, shortcourses, symposiums, seminars, and institutes is vested in the Conference and Institute Division of University Extension. The role of this office is to promote, coordinate and administer conference programs in cooperation with faculty members of the various campus organizations and with individuals and groups outside of the University. Noncredit courses are also organized by this office in cooperation with the academic departments of the University.

The Continuing Education Center (formerly Mitchell Motel) has been acquired by the University as the first phase of a plan to develop capacity for an extensive year-round program of continuing education through the Conference and Institute Division. The ultimate goal is to build a program and complementary facilities to serve groups of people with special short-term educational needs on a continuing basis as part of the public service activity of the University.

There are no limitations on the clientele to be served through the Continuing Education Center in terms of age or educational back-

ground. All that is required is a desire to learn. The scope of the program will be as broad as available knowledge resources will permit.

Continuing learners may participate in educational activities for a variety of justifiable reasons, which all relate to recognized needs for self-improvement, an appetite for intellectual stimulation through social interaction or simply a desire to know.

Continuing Education

A large number of people living in communities or areas remote from the University campus desire to benefit from university training but cannot come to Logan to register for resident courses. For this group, USU provides a liberal program of Continuing Education which includes Extension classes, Independent Study (correspondence), and a number of other educational services. USU is a member of the National University Extension Association.

Extension Class Division

Courses offered by USU are made available in approximately 30 different communities of the state. Such courses are offered by the respective academic departments. Off-campus credit courses are equivalent in content hours of class instruction and preparation, and otherwise meet the same prerequisites as comparable classes offered on the University campus.

Except for the 45 credits which must be earned in residence on the USU campus, Extension classes may meet the requirements for a bachelor's degree. Extension classes also meet requirements for a master's degree with approval of the School of Graduate Studies.

All instructors in Extension courses are either members of the regular University teaching faculty officially assigned to the teaching project concerned or non-resident members approved by the head of the department and by the University administration.

The registration fees charged for Extension classes conform to regulations.

Independent Study Division (Correspondence-Home Study)

Many individuals desire organized, systematic instruction but live in isolated areas, or for other reasons cannot meet for class instruction on the University campus or its resident centers. For such individuals, USU provides a liberal offering through a wide variety of Independent Study courses in many of the departments of the University. This program furnishes an excellent opportunity to students of high school or college level, and to adults who desire general education and professional improvement in selected fields.

For admission to Independent Study courses of college level, an enrollee must be at least 19 years of age or a high school graduate, or must submit 15 credits of high school work.

High school students demonstrating superior ability may enroll for University credit courses.

As many as one-fourth of the credits necessary for a bachelor's degree may be earned by completing Independent Study courses (45 credits). Each college of the University, subject to faculty approval, determines the nature and the amount of Independent Study credit accepted for admission and graduation. In no case is Inde-

pendent Study credit to comprise more than 25 percent of the total number of credits accepted for graduation.

Graduation Deadline. Seniors who plan to apply Independent Study credits toward graduation, in any one year, must have their courses completed by May 1, so that lessons and examination may be evaluated and credit filed in the Admissions and Records Office two weeks prior to the day of graduation.

An enrollee is allowed one year in which to complete a course. An extension of time may be granted upon payment of a small fee.

USAFI Courses. USU cooperates with the United States Armed Forces Institute (USAFI) at Madison, Wisconsin, in providing Independent Study courses at a reduced cost to men and women in active service in the Army, Navy, Air Force, Marine Corps, or Coast Guard. A member of any one of the armed forces desiring to enroll in Independent Study courses should contact the education center at the base where he is located.

Fees. A fee of $11 per credit is charged for Independent Study courses of college level. High school course fees are $30 per credit and $20 per half credit. All fees are subject to change.

Independent Study Catalog. Anyone interested in Independent Study may request a catalog containing complete information concerning this program by writing to the Independent Study Division.

Uintah Basin Center for Continuing Education

USU established a continuing education center in the Uintah Basin at the beginning of fall quarter 1967.

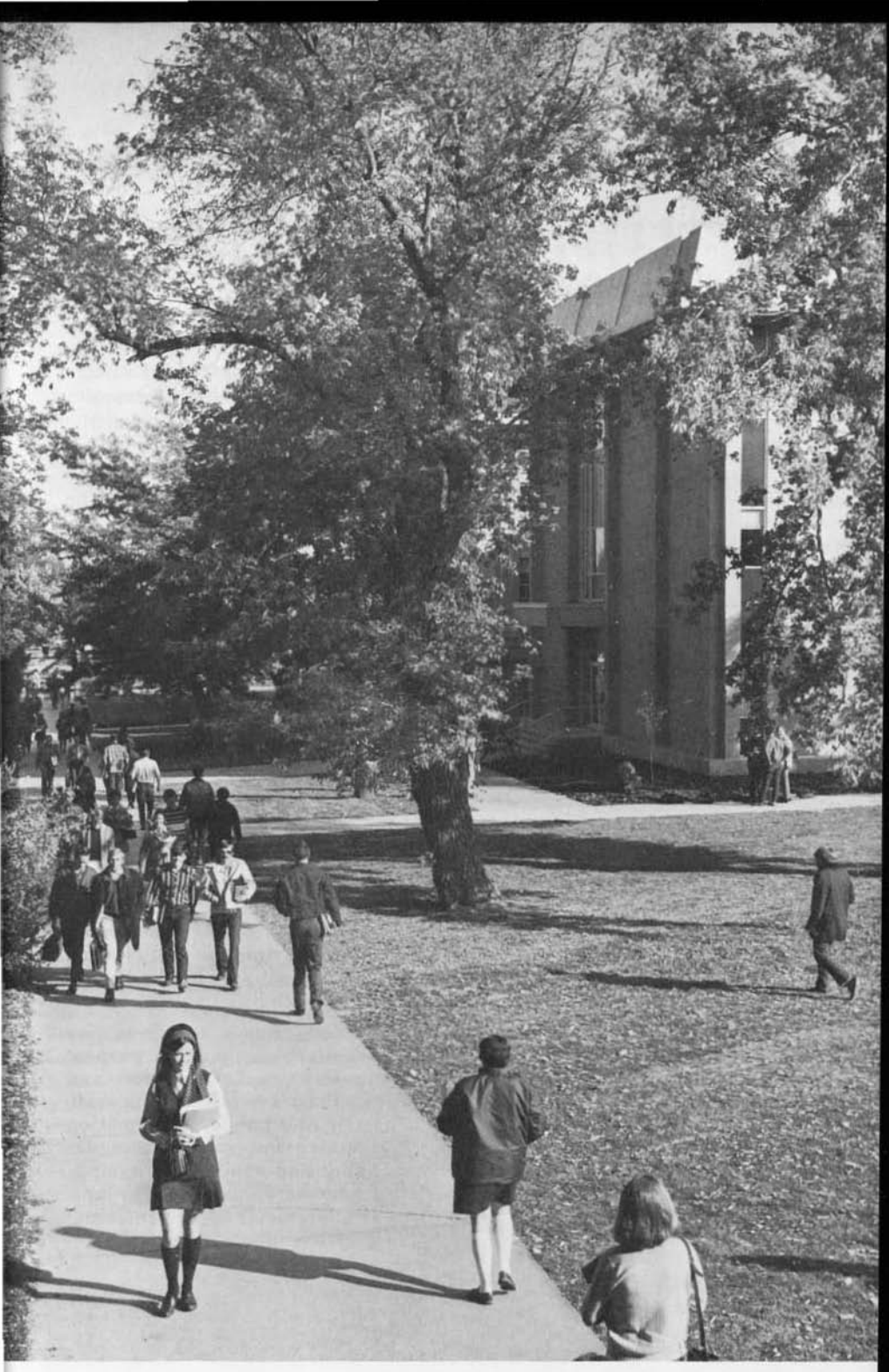
A program of seminars, shortcourses, undergraduate and graduate courses is offered in several communities located in Uintah, Duchesne, and Daggett counties.

The Uintah Basin center office is located at Roosevelt, Utah.

Southeastern Utah Center (Moab)

The State Legislature authorized funds for the establishment of the Southeastern Utah Center effective July 1, 1969.

Major objectives of the programs include implementing a series of lower division undergraduate credit courses, a limited program of upper division and graduate classes, fine arts programs, seminars, shortcourses, and lecture series.



UNIVERSITY DEVELOPMENT

University Relations

Assistant to the President for University Relations William Rolfe Kerr
Assistant Director J R Allred
Office in Main 118

Good teaching, sound research and other practical services performed well are USU's chief means of public relations.

Being a public, tax-assisted institution, the University has the responsibility of keeping the public informed as to its operations.

The office of University Relations assumes this responsibility and plans and executes programs and projects designed to maintain contact between the University and the various publics which the University serves. This responsibility includes dissemination of news and information within the University and off-campus to individuals, groups and the mass media.

University Information Services

University News Editor J R Allred
Office in University Relations 105

Assistant News Editors
Cliff Cahoon
Sheryl S. White

Feature Writer
John S. Flannery

Writer-Editor
Linda E. Keith

Agricultural Information Specialist Cleon M. Kotter

Sports Information Editor
Kenneth D. Mitchell

Radio-TV Producer-Director
Roger McEvoy

Information is disseminated daily and weekly through the press, radio and television. These releases include informational articles and programs of educational worth. They include articles on research in many fields and news of general campus events.

University Campus Information and Tours Program. The purpose of the Campus Information and Tours Program is to provide courteous and helpful information to campus visitors. It includes arranging and conducting campus tours for individuals and groups, and is supervised by the Information Services department.

University Alumni and Development Programs

Assistant to the President for Development and Special Projects
Gerald R. Sherratt
Office in Main 116

The University Alumni and Development Programs were established to promote the interests and welfare of Utah State University and to help the University increase and improve its educational and other services.

Through the Alumni Association, former Aggies can maintain contact with their alma mater and also keep up on recent accomplishments of classmates through Alumni publications. Alumni chapters provide business and social activities and an opportunity to assist the University with special projects in their areas.

The Development Fund encourages contributions to the University, plus any items having educational, artistic, or historical value. It then determines how these shall be used to further the University's interests and goals. Included in the Development Fund are solicitation programs, such as the President's Club, Old Main Society, and the University Club.

University Alumni Association

President William R. Stockdale
Director of Alumni Affairs Gerald R. Sherratt
Associate Director of Alumni Affairs MarDell C. Parrish
Office in Alumni House, 921 North 9th East

Utah State University Alumni Association now numbers more than 93,000 members. These members are the graduates and other former students of Utah State, who are now keeping in touch with the University and supporting its activities through the work of the Association.

Purpose. It is the purpose of the Alumni Association to promote the interests and welfare of Utah State University.

Government. The governing power of the Association is vested in the Alumni Council, composed of 15 elected members and ex-officio members. The current president of the Senior class and the president of the Associated Students' organization are both ex-officio members of the Council. The President of the Alumni Association is a member of the Utah State University Institutional Council.

Function. The Alumni Association is the medium through which former students of Utah State are kept in contact and are served after leaving the campus. Efforts are made to maintain a complete record of every former student throughout life, and his accomplishments and progress are re-

corded. Former students receive the **Outlook** newspaper, an official publication of the association, full of news and reports on the University. The association maintains alumni chapters in major areas where former students are located. Through this local organization former students are kept in contact with each other, and they meet and participate in business and social activities. They likewise assist the University with special projects in their areas. The association endeavors to keep in contact with all former students and assists them in reference and contact problems.

The Alumni Association takes the leadership in sponsoring such campus events as Homecoming, Distinguished Service Awards, Reunions, and the Senior Reception, as well as aiding in athletic and other school events.

Alumni Association-Library Endowment Trust Fund is a special downment Trust Fund is a special fund which has been established by the Association. This fund was established from popular subscriptions. Earnings from the fund are given to the University library to aid it in the purchase of books which ordinarily could not be bought from the regular library budget.

University Development Center

Director of Development Gerald R. Sherratt
Director of Deferred and Corporate Giving A. LeRon Johnson
Director of Annual Giving Paul R. Weiser
Director of Foundation Giving John W. Steinitz
Supervisor of Development Records Donna Everton
Office in Main 342

A key part of USU's development program is the Development Center, a non-profit corporation (established August 11, 1958) to encourage grants, bequests, and gifts of money, property, works of art, historical papers and documents, and museum specimens having educational, artistic or historical value. The Development Center thus helps the University increase and improve its educational and other services.

A ten-man board of directors of this non-profit corporation represents the USU Institutional Council, the Alumni Association, and the University administration.

Functions and powers of the Board of Directors are: 1) to determine the specific University projects for which gifts of money or property will be solicited; 2) to obtain from alumni and former students of the University and from other interested persons, corporations or foundations, voluntary contributions to the University, and to establish such bylaws and policies as are necessary to carry out the purpose of the Fund; 3) to determine from time to time the methods of solicitation and publicity and to maintain the active interest of alumni and of the public in the Development Fund; 4) to elect and appoint such officers and committees and incur necessary expenses within its budget allowance as are needed for the proper accomplishment of its purpose; 5) to coordi-

nate all University efforts relating to the Development Fund.

Solicitation programs of the Development Fund include: "Endowment for the 70's," the Annual Giving campaign; the Quarterback Club; the President's Club; the Old Main Society, which recognizes large single donors to the University's programs; the Estate Planning Program, for those wishing to bequeath property, securities, and money to the University in their wills; and the University Club, which uses funds to increase scholarship offerings to outstanding students.

Those whose names are enrolled in the Old Main Society, as of January 1, 1971, include: Wilford F. Baugh[1] and Isabel P. Baugh, John S. Boyden and Orpha S. Boyden, Guy N. Cardon and Joyce J. Cardon, Hung Wo Ching and Elizabeth L. Ching, Orson A. Christensen and Rae N. Christensen, Carlton F. Culmsee, Virginia F. Cutler, Paul M. Dunn and Neva K. Dunn, George S. Eccles and Dolores D. Eccles, Marguerite O. Greaves, J. Eastman Hatch and Erma B. C. Hatch, L. Boyd Hatch[1] and Anne M. Hatch, Ronald V. Jensen and Doria Jensen, LeGrand Johnson and LaRu K. Johnson, Emma Eccles Jones, Melvin L. Kent and Editha S. Kent, William G. Kohner, Edgar B. Mitchell and LaPrile B. Mitchell, Gilbert C. Moesinger and Donna S. Moesinger, N. Glen Neeley[1] and Deta P. Neeley,[1] Val W. Palmer[1] and Alta R. Palmer, Theodore G. Rechow and Grehta C. Rechow, Irving Shepard and Mildred R. Shepard, D. A. Skeen and Bertha K. Skeen, Allen W. Stokes and Alice H. Stokes, Richard C. Stratford and Vera C. Stratford, Obert C. Tanner and Grace A. Tanner, Norma Eccles Treadwell, Rudolph L. Van Kampen and Afton R. Van Kampen, Eldred L. Waldron and Inez T. Waldron, Jesse K. Wheeler and Mary M. Wheeler, Gerald S. Wilson, and Robert L. Wrigley, Jr. and Ada E. Wrigley.

[1]Deceased.

UNIVERSITY PERSONNEL

Utah State Board of Higher Education

Peter W. Billings, *Chairman, Salt Lake City*
Donald B. Holbrook, *Vice Chairman, Salt Lake City*

Warren H. Bullock, *Cedar City*
Richard L. Evans, *Salt Lake City*
George C. Hatch, *Salt Lake City*
Ira A. Huggins, *Ogden*
Henry R. Hurren, *Logan*
Richard J. Maughan, *Bountiful*
Merrill J. Millett, *Vernal*
Jean Overfelt, *Gunnison*
Luke G. Pappas, *Price*
Charles E. Peterson, *Provo*
Roy W. Simmons, *Salt Lake City*
H. Bruce Stucki, *St. George*
Nathan C. Tanner, *Ogden*

G. Homer Durham, *Salt Lake City*
Executive Officer and Commissioner of Higher Education

USU Institutional Council

Phillip A. Bullen, *Chairman, Salt Lake City*
W. B. Robins, *Vice Chairman, Salt Lake City*
J. D. Harris, *Tremonton*
Beverly D. Kumpfer, *Salt Lake City*
Snell Olsen, *Spanish Fork*
Rex G. Plowman, *Lewiston*
Alva C. Snow, *Roosevelt*
Jane Tibbals, *Salt Lake City*
William R. Stockdale, *ex-officio, Ogden*
L. Mark Neuberger, *Secretary to the Council, Logan*

Administration

President: Glen L. Taggart
Assistant to the President for University Relations: W. Rolfe Kerr
Assistant to the President for Development and Special Projects: Gerald R. Sherratt
Director, Athletics: Frank Williams

Provost: R. Gaurth Hansen
Assistant Provost for Institutional Analysis and Planning: Lee B. Stenquist
Dean, Admissions and Records: L. Mark Neuberger
Director, International Programs and Studies: Bruce H. Anderson
Director, Summer Quarter, and Director, Space Management: Ellvert H. Himes
Director, Honors Programs: Raymond T. Sanders
Univerity Librarian and Director of Learning Resources Program: Milton C. Abrams

Vice President for Student Affairs and Dean of Students: Claude J. Burtenshaw
Dean of Women: Helen Lundstrom

Vice President, Business: Dee A. Broadbent
Assistant Vice President, Finance: J. LeMar Larsen
Controller: Donald A. Catron
Budget Officer: George Allen, Jr.
Purchasing Agent: Francis Baugh
Assistant Vice President, Business: Evan N. Stevenson
Director of Personnel: Lavon H. Herzog
Internal Auditor: William E. Watkins
Director of Physical Plant: H. Val Peterson

Vice President, Research: D. Wynne Thorne
Director, Agricultural Experiment Station: Kenneth W. Hill
Director, Computer Center: Wendell L. Pope
Dierctor, Ecology Center: John M. Neuhold
Director, Aeronomy Center: Clayton Clark

Vice President, Extension and Continuing Education: J. Clark Ballard
Associate Director, Cooperative Extension: C. Dennis Funk
Associate Director, Continuing Education: Lloyd A. Drury

Dean, School of Graduate Studies: Eldon J. Gardner

Dean, College of Agriculture: Vearl R. Smith

Dean, College of Business: Robert P. Collier

Dean, College of Education: Oral L. Ballam

Dean, College of Engineering: Dean F. Peterson, Jr.

Dean, College of Family Life: Phyllis R. Snow

Dean, College of Humanities, Arts and Social Sciences: M. Judd Harmon

Dean, College of Natural Resources: Thadis W. Box

Dean, College of Science: Ralph M. Johnson

Faculty of the University

ABRAMS, MILTON C. (1949) University Librarian and Director of Learning Resources Program; Prof. of Political Science and Library Science. BA 1948, MS 1952, Utah State University, PhD 1963 University of Utah.

ACORD, CLAIR R. (1947) Prof., Extension Services; Extension Agent. BS 1937 Utah State University, MS 1956 University of Illinois, PhD 1967 University of Kentucky.

ADKINS, BRYCE E. (1964) Prof. of Elementary Education. AB 1949 Peru State College, MA 1954, PhD 1958 State University of Iowa.

AGATHANGELIDES, DEMETRIOUS (1966) Res. Asst. in Plant Science. BS 1962 Utah State University.

AHLSTROM, C. BLYTHE (1964) Asst. Prof. of History. BS 1958 Utah State University. MA 1961 Columbia University.

AITKEN, PERCY G. (1969) Research Technician; Lecturer in Spanish. BS 1954 Kansas State College.

ALBRECHT, STAN L. (1970) Instr. in Sociology and Social Work. BS 1966 Brigham Young University, MA 1968, PhD 1970 Washington State University.

ALBRECHTSEN, RULON (1969) Prof. of Plant Science. BS 1956, MS 1957 Utah State University, PhD 1965 Purdue University.

ALDER, DOUGLAS (1963) Assoc. Prof. of History; Associate Director, Learning Resources Program. BA 1957, MA 1959 University of Utah, PhD 1965 University of Oregon.

ALDER, JEAN M. (1970) Instr. in Clothing and Textiles. BeD 1964 University of Alaska, MS 1967 University of Utah.

ALGER, TERRY DEAN (1967) Asst. Prof. of Chemistry. BS 1962, PhD 1966 University of Utah.

ALLEN, GEORGE JR. (1961) Budget Officer. BS 1950 University of Utah, MBA 1963 Utah State University.

ALLEN, GERALD L. (1961) Manager of KUSU-TV-FM and Radio-TV; Asst. Prof. of Speech. BS 1960, MS 1965 Utah State University.

ALLEN, J. WHORTON (1964) Asst. Prof. and Couns. in Student Services. BS 1955 Brigham Young University, EdD 1969 Utah State University.

ALLEN, ROSS R. (1966) Prof. of Secondary Education. BS 1952, MS 1955, EdD 1962 University of Utah.

ALLRED, A. FULLMER (1945) Ornamental Horticultural Specialist, Extension Services; Assoc. Prof. of Plant Science. BS 1938 Brigham Young University, MS 1966 Utah State University.

ALLRED, E. MALCOM (1961) Prof. of Education. BA 1948 Southern Idaho College of Education, MS 1953 University of Idaho, EdD 1961 Colorado State College.

ALLRED, GLENN D. (1970) Technical Editor. BA 1968 University of Utah.

ALLRED, J R (1958) Asst. Director of University Relations; University News Editor; Asst. Prof. of Journalism. BA 1950 University of Utah, MS 1964 Colorado State University.

ALLRED, KEITH REID (1957) Forage Specialist, International Programs; Prof. of Agronomy. BS 1951 Brigham Young University, PhD 1955 Cornell University.

AMISIAL, ROGER A. (1970) Asst. Prof. of Hydrology and Computer Technology. BS 1962 Universite' d'Stat d'Hai'ti, MS 1965 Colorado State University, PhD 1969, Utah State University.

ANDERSEN, JAY C. (1964) Assoc. Prof. of Agricultural Economics. BS 1953, MS 1958 Utah State University, PhD 1962 Iowa State University.

ANDERSEN, LADELL (1961) Head Basketball Coach; Instr. in Physical Education. BS 1951 Utah State University.

ANDERSEN, MARION (1967) Artist-in-Residence in Dance.

ANDERSON, BRUCE (1951) Prof. of Irrigation Engineering; Director Agricultural and International Programs. BS 1950, MS 1954, Utah State University, DEngr 1963 University of California.

ANDERSON, J. LAMAR (1961) Assoc. Prof. of Plant Science. BS 1955 Utah State University, PhD 1961 University of Wisconsin.

ANDERSON, JARVIS (1968) Asst. Prof. of English. BS 1958, MS 1959 Utah State University.

Note: Date in parenthesis indicates year the person joined USU staff, though not necessarily in present position.

ANDERSON, JAY O. (1951) Prof. of Animal Science. BS 1943 Utah State University, MS 1948, PhD 1950 University of Maryland.

ANDERSON, JON I. (1964) Assoc. Prof. of Art. BPA 1958 Art Center School, MFA 1968 Utah State University.

ANDERSON, RICHARD C. (1963) Assoc. Prof. of Chemistry. BS 1954, PhD 1961 Brigham Young University.

ANDERSON, ROICE H. (1947) Prof. of Agricultural Economics. BS 1935 University of Wyoming. MS 1941, PhD 1943 Cornell University.

ANDERSON, THOMAS C. (1967) Res. Assoc. Utah Water Research Lab. BS 1965, MS 1966 Utah State University.

ANDERSON, WENDELL B. (1947) Prof. of Political Science. BS 1935, MS 1940 Utah State University, JD 1941 George Washington University.

ANDRA, JEAN (1962) Instr. in English. BS 1961, MA 1964 Utah State University.

ANDRA, THEODORE (1961) Asst. Prof. of English. BS 1961, MA 1963 Utah State University.

ANDRE, RICHARD J. (1967) Asst. Prof. of English. BA 1957, MA 1959 Stanford University.

ANDREWS, WADE H. (1965) Prof. of Sociology. BS 1947, MS 1949 Utah State University, PhD 1956 Michigan State University.

ARAVE, CLIVE WENDELL (1964) Asst. Prof. of Dairy Science. BS 1956, MS 1957 Utah State University, PhD 1965 University of California.

ARGYLE, BELL F. (1954) Assoc. Prof., Extension Services; Extension Agent. BS 1940 Utah State University, MEd 1964 Colorado State University.

ARNEKLEV, BRUCE L. (1966) Res. Director, Edith Bowen Lab School. BS 1959, MS 1966 University of Oregon.

ARNOLD, THOMAS K. (1969) Asst. Prof. and Coordinator of Continuing Education, Moab. BS 1948, MS 1950, MS 1951 Florida State University.

ARRINGTON, LEONARD J. (1946) Editor of **Western Historical Quarterly**; Prof. of Economics. BA 1939 University of Idaho, PhD 1952 University of North Carolina.

ASHCROFT, GAYLEN L. (1961) Assoc. Prof. of Soils and Meteorology. BS 1954, MS 1956 Utah State University, PhD 1962 Oregon State University.

ASPLUND, O. WILLIAM (1968) Asst. Prof. of Economics. BA 1964 University of Alberta.

ATKINSON, SHERWIN J. (1958) Res. Assoc., Animal Science. BS 1955 Utah State University.

AUSTIN, LLOYD HALE (1967) Res. Engineer, Agricultural and Irrigation Engineering. BS 1967 Utah State University.

BACH, W. KENNETH (1970) Special Lecturer in Agricultural and Irrigation Engineering. BS, 1937 Utah State University, MS 1949 University of California.

BAGLEY, JAY M. (1954) Prof. and Director of Utah Water Research Lab. BS 1952, MS 1953 Utah State University, PhD 1964 Stanford University.

BAHLER, THOMAS L. (1949) Prof. of Zoology, Physiology. BA 1943 College of Wooster, PHD 1949 University of Wisconsin.

BAIRD, GLENN T. (1946) Supervisor of 4-H and Youth Programs; Assoc. Prof., Extension Services. BS 1935 Utah State University, MS 1964 University of Maryland.

BAKER, DORAN J. (1959) Director of Electro-Dynamics Lab; Prof. of Electrical Engineering. BS 1953, PhD 1956 University of Utah.

BAKER, GERALD M. (1965) Asst. Prof. of Botany. BA 1956 Williamette University, MA 1959 Indiana University, PhD 1969 Oregon State University.

BAKER, KAY D. (1969) Director of Space Science Lab; Prof. of Physics and Electrical Engineering. BS 1956, MS 1957, PhD 1966 University of Utah.

BALLAM, ORAL L. (1963) Dean, College of Education; Prof. of Education. BS 1949, MS 1955 Utah State University, EdD 1961 University of California (Los Angeles).

BALLARD, J. CLARK (1959) Director of International Programs; Prof. of Plant Science. BS 1947 Utah State University, PhD 1950 Cornell University.

BALPH, DAVID F. (1964) Assoc. Prof. of Wildlife Resources. BA 1955 Hiram College, MS 1961, PhD 1964 Utah State University.

BARDWELL, FLORA H. (1950) Food and Nutrition Specialist; Assoc. Prof. Extension Services; BS 1940 Brigham Young University, MS 1963 Utah State University.

BARKER, DUANE A. (1967) Asst. Prof. of Accounting. BS 1962 University of Utah, MBA 1967 Utah State University, CPA 1967 State of Utah.

BARLOW, JOEL C. (1946) Area Horticulturist in Plant Science; Assoc. Prof., Extension Services; Extension Agent. BS 1938, MS 1963 Utah State University.

BARNARD, JOHN J. (1936) Dairy Specialist, Extension Services; Assoc. Prof. of Dairy Science. BS 1933 Utah State University, MS 1959 University of Wisconsin.

BARNEY, CATHERINE H. (1970) Home Agent, Extension Services. BS 1947 University of Utah.

BARTHOLOME, LLOYD W. (1968) Assoc. Prof. of Business Education and Office Administration. BS 1955 Northern State College, MA 1960 Los Angeles State College, EdD 1968 University of California (Los Angeles).

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BENSON, SERGE N. (1964) Asst. Prof. of Business Law, and Business Administration. BS Utah State University, JD 1934 Washington University.

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BOYER, FAY W. (1955) Assoc. Prof., Extension Services; Extension Agent. BS 1950, MS 1960 Utah State University.

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CONOVER, C. GLENN (1970) Asst. Prof. of Sociology and Social Work. BA 1943 University of Utah, MSW 1948 University of Denver, ACSW 1955.

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COOK, PAUL FRANKLIN (1968) Asst. Prof. of Psychology. BS 1960 Utah State University, MS 1963, PhD 1968 Brigham Young University.

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CORMAN, Arthur (1970) Research Engineer. BS 1957 Northeastern University.

COX, LOIS (1961) Technical Writer, Research. BS 1954 University of California (Davis).

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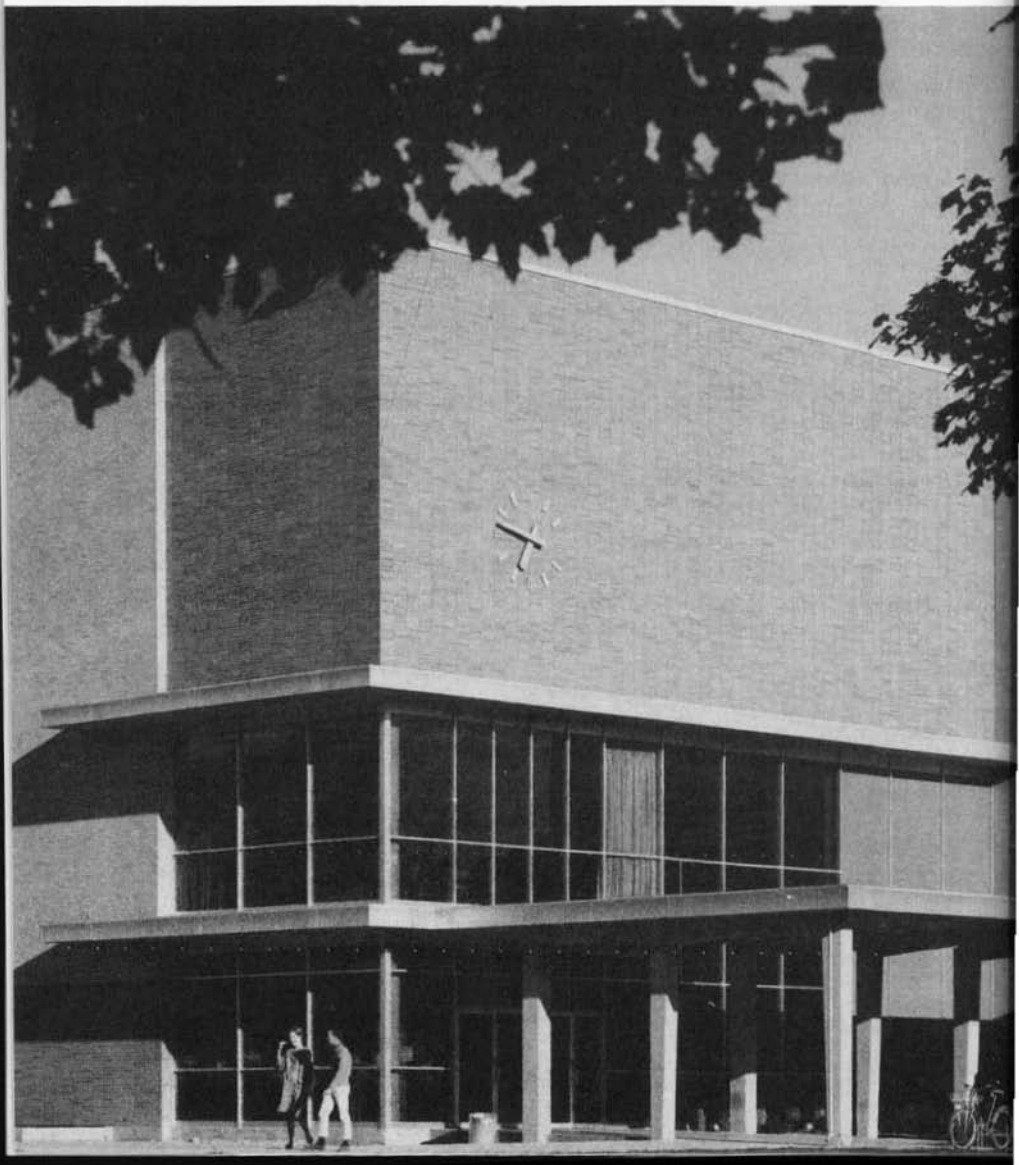

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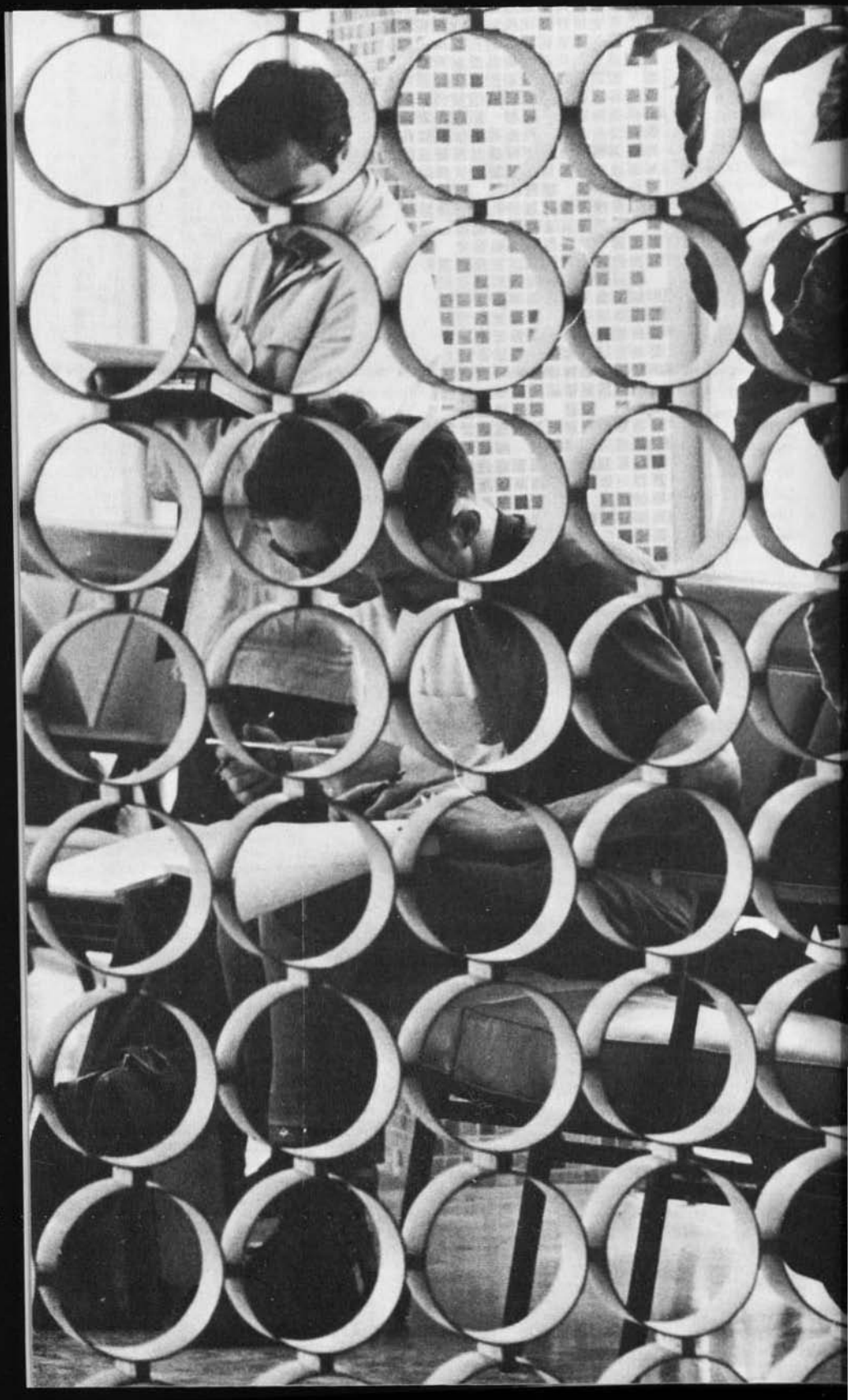

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A Class Schedule Bulletin is available for 25 cents

When writing Utah State University concerning any of the following matters, please address letters as follows:

University Policy: President's Office

Alumni: Assistant to the President for Development and Special Projects

Admissions, Transcripts of Credits: Dean of Admissions and Records

Student Affairs: Vice President for Student Affairs

Housing: Housing Office

Costs and Financial Aids: Financial Aids Officer

Requests for Campus Tours: Information Services

Requests for Programs, Speakers, Music or Literature on USU: School Services

Requests for Films, Movies: Audio-Visual Service Librarian

Extension Classes or Independent Study (Correspondence or Home Study): Associate Director of Extension Services

Extension Publications: Extension Publications Editor

Photographs: Arlen L. "Ted" Hansen, USU Photographer

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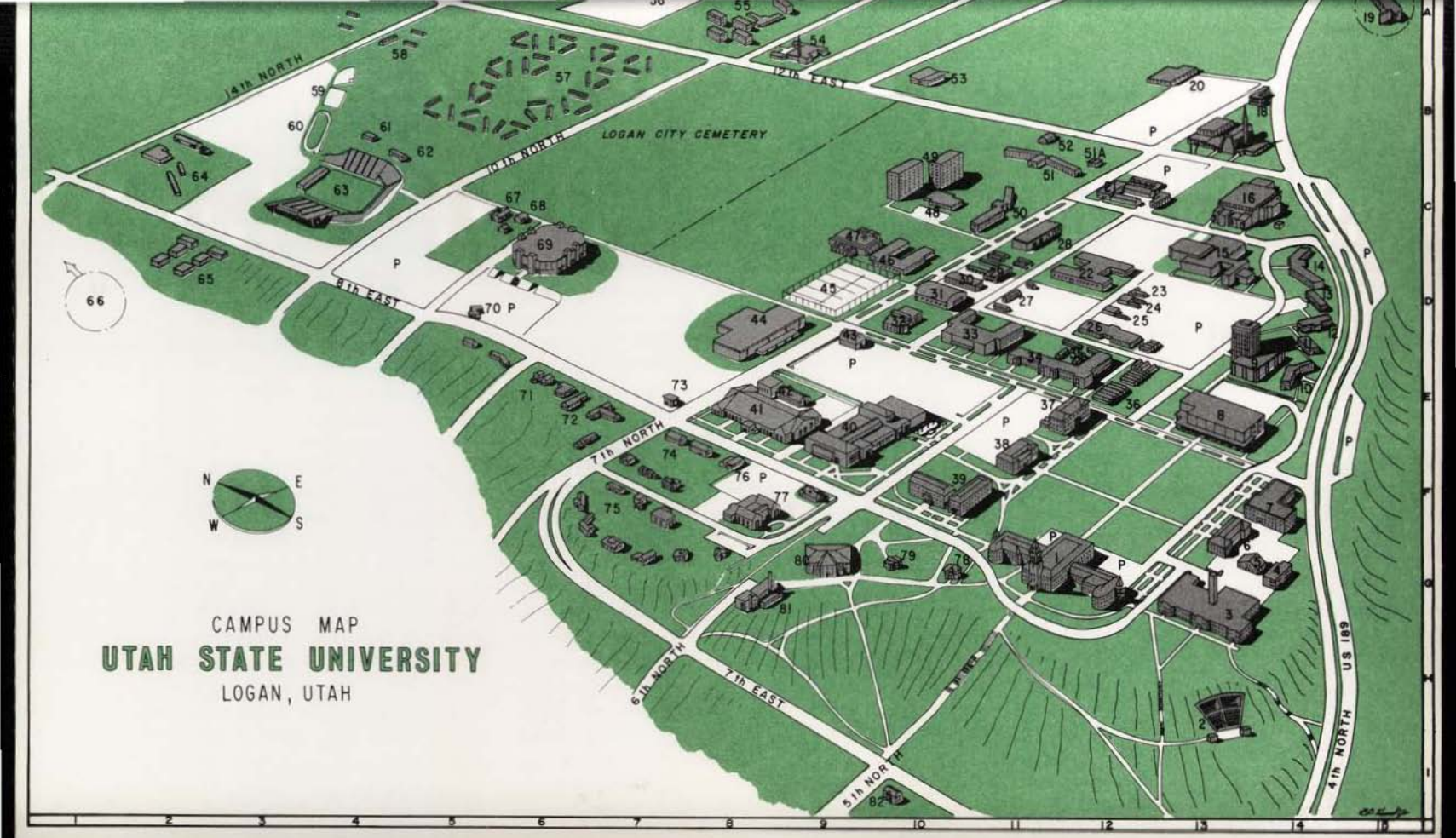
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10th NORTH
LOGAN CITY CEMETERY
8th EAST
7th NORTH
6th NORTH
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5th NORTH
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CAMPUS MAP
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LOGAN, UTAH